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SOVIET VIROLOGY

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SOVIET VIROLOGY 1962--1965

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INTRODUCTION

This report reviews literature on Soviet virological research published between 1962 and 1965, inclusive, pertaining to the development and administration of vaccines and other therapeutic preparations designed to protect humans and animals against virus diseases. It includes data on preparation and innoculation techniques and challenge tests on laboratory animals to test the effectiveness of new vaccines. Coverage of related studies in the epidemiology, detection, diagnosis, vectors, and infection cycles of viral diseases is also included. Appendices provide additional information on virus research personnel and institutions, and on virological conferences held during those years.

I. THE TICKBORNE ENCEPHALITIS COMPLEX

Viruses of the tickborne encephalitis complex are group B arboviruses and are closely related antigenically, often behaving like distinct strains of a single viral species. The Far-Eastern form of the disease is usually more virulent than the European form [275]. Tickborne encephalitis (TBE, RSSE, Far-Eastern encephalitis, biphasic (two-wave) meningo-encephalitis, etc.) has a broad host range but is usually spread by ixodid or closely related ticks, generally *Ixodes persulcatus* and *Ixodes ricinus*.

Fleas have been implicated as vectors as well [244, 281, 111, 282]. In one study, the species composition, host range, and population dynamics of fleas in the Kalinin, Perm, and Kemerovo oblasts were studied. It was found that fleas transmitted the virus to rodents within 6 hours after their birth; this explained the relatively high antibody titers in the rodents and the low numbers of ixodid tick larvae and nymphs found in the vicinity of burrows. Transmission by fleas was confirmed experimentally [110].

Virological studies of ticks in epidemic regions are made regularly, especially during peak infective periods [110, 109, 261, 41, 233].

Hundreds of distinct strains have been isolated, including several strains that are antigenically and morphologically different from standard strains and are often highly pathogenic in tissue cultures [109, 41]. Birds, rabbits, livestock, hedgehogs, and other wild animals are also TBE vectors [164, 55]. TBE virus has been isolated from thrushes *(Oriocichla dauma)* carrying *Ixodes persulcatus* ticks [275, 248] and from hedgehogs, which maintain the virus during hibernation after being infected by tick bites or by eating contaminated food [143, 255, 74, 264].

A large-scale survey of virological and serological data on arboviruses isolated in the eastern Soviet Union revealed TBE, EEE, WEE, and Chikungunya virus in over 1000 samples from epidemic foci in Siberia, the Irkutsk region, eastern Kazakhstan, and other regions [59, 26]. Secondary examination of insect, bird, animal, and human organs and tissues from eastern

Kazakhstan yielded data on the first isolation of Casals group A viruses in the eastern USSR [12,91]. Strains K-10, K-13, and K-16 isolated from mosquitoes produced symptoms within 24 hours. Strains PT-149, PT-151, PT-161 and PT-182 isolated from the birds *Sturnus vulgaris*, *Corvus corona*, and *Larus ridibundus* had incubation periods lasting from 1--8 days [12]. Transovarian transmission of TBE virus has been demonstrated in a small percentage of certain tick species. Its potential importance is that it ensures the infection of a large number of larvae and consequently, wide dissemination amoung the local small-mammal population. The species displaying this trait are *Ixodes persulcatus*, *I. ricinus*, *I. hexagonis*, *Dermacentor silvarum*, *Haemaphysalis concinna*, and *H. japonica*. Experimental infection of *I. ricinus* showed that artificial means of infection could be used. Among females, 3.3% transmitted the virus when they were infected by feeding on infected mice and 21 % when the virus was injected directly into the body cavity. Although the latter method produced better results, the inoculation process was often fatal to the ticks. The strains did not lose their cytopathogenicity during transovarian passage [249].

A. Epidemiological Data On the Tickborne Encephalitis Complex

At a conference on arbovirus infections held in Moscow in September 1964, the Eleventh Scientific Session of the Institute of Poliomyelitis and Virus-Encephalitis Diseases of the Academy of Medical Sciences was devoted to discussion of tickborne encephalitis, Omsk fever, Kemerovo tick fever, and related diseases [203]. During the four days of the session, 85 papers were presented which were later incorporated into the published collected papers of the meeting. All aspects of these diseases from classification of the viruses to prophylaxis and immunization were discussed. A paper presented by A. M. Butenko and Ye. S. Sarmanova on the isolation of new virus strains in Kemerovo and Astrakhan oblasts complements the work of M. P. Chumakov et al. on the isolation of a serologically distinct member of the TBE complex which was accomplished during the joint Czech-Soviet virological expedition during the summer of 1962. This expedition made virological examinations of ixodid ticks, suspected human carriers, and healthy persons bitten by ticks in Western Siberia. Both typical and atypical strains were isolated. In one

region, 20 serologically similar strains were discovered which produced a febrile type of encephalitis in humans. The new virus strains were cytopathic in chick tissue culture in 48--72 hours, multiplied well in the yolk sacs of 7-day chick embryos, were fatal to newborn white mice but generally not to adults, and were antigenically distinct from the rest of the encephalitis complex although they produced similar symptoms. Later, 20 similar strains were isolated which were remarkably pathogenic to intracerebrally inoculated rats and hamsters, producing brief fever in Rhesus monkeys and having varied effects on tissue cultures [40]. A report of a test of a new cultural inactivated vaccine made on a million subjects was given by D. K. L'vov, and data on its production technology and quality control were given by A. V. Gagarina and I. M. Rodin. Kemerovo tick fever was discussed at a special session. Immunological shifts in humans, the capacity of the virus to agglutinate erythrocytes, morphology, and the isolation of similar viruses in other parts of the Soviet Union were also considered [203].

In typical epidemic foci, sizable percentages of captured ticks carried highly active virus [182, 232]. In some foci the outbreaks have a mosaic pattern which, some Soviet scientists suggest, depends on the variable virulence of the local strains isolated during epidemics [186]. A high percentage of wild and domestic animals and wild birds usually carry viruses, and humans in such districts usually have complement - fixing antibodies in high titers [155]. At least one case of a patient with relapsing TBE has been reported [123]. Simultaneous cases of both TBE and Omsk fever have been reported in humans and both diseases usually increases in occurrence with increases in the rodent and ectoparasite population, pointing to similarities in their mode of distribution since they are antigenically distinct [263, 59].

A study on comparative natural immunity in reptiles susceptible to TBE virus showed that in reptiles infected with TBE by various routes under different temperature conditions and by different techniques, temperature was found to be the most important single factor changing immune response. No immune response was observed in *Eremias velox* and *Agama caucasia* individuals kept at 4°C, whereas the earliest appearance of antibodies and the highest antibody titers occurred in individuals kept at 37°C [273].

B. The Behavior of TBE Virus in Cell and Tissue Culture

Czech researchers have found that in tissue cultures inoculated with two or more viruses, cell resistance involves formation of interferon-like inhibitors that suppress the invading virus in cultures already adapted to one type of virus [9, 227, 207]. This phenomenon is the basis for a method in which TBE virus can be titrated by determining cytopathic effect in tissues infected with polioviruses. In this method, the TBE viruses resisted the effects of poliovirus, and by some mechanism not yet known, but probably involving production of an interferon-like sustance, inhibited the cytopathic effects of poliovirus [8]. Such an interference method can be used to evaluate the effectiveness of TBE vaccines. A method reported in 1963 by Al'shteyn et al. was economical and precise, but was more time-consuming than intracerebral inoculation of mice [11]. A plaque-assay method, on the other hand, depends on the definitive identification of plaques; any condition that interferes with plaque formation is to be avoided. Cells, therefore, must not be pretreated with interferon if plaques are to be clear. This method can also be used to obtain viral clones by repeated plaque isolation and subculturing in newborn mouse brain [140].

Many cell and organ cultures have been screened as suitable media for the evaluation of inocula and vaccines. Comparative evaluation of tissue lines by Karaseva and Semenov confirmed the suitability of chick-fibroblast or swine-embryo tissue [13, 14, 15, 92]. Titration in human-embryo fibroblasts has yielded results 50 times less sensitive than the intracerebral inoculation of mice, but within its effective range it is clearer, more precise, and reproducible, and can be used for detecting neutralizing antibody [10, 56]. Tick tissue culture is reported as the best medium for the early detection of tickborne encephalitis virus since a marked cytopathic effect is produced by small quantities of virus [189]. In growing virus in tissue cultures, agitation was shown to aid in the production of higher titer [75, 137]. Chick-embryo tissue was best for work in which gradual and continual release of virus from cells without marked cytopathic effect was desired [154]. Several authors report a "partial" cytopathic effect in lines that have been chronically infected with the virus, with a reduction in virus multiplication rate and a consistently low percentage of cell-associated virus (usually 1 % intranuclear) with the rest in the culture fluid [138, 16, 19]. Some cell lines are

affected by medium composition with consequent changes in cytopathic effect [139], and all cultures of mammalian cells also had a resistance to superinfection as discussed above, although long-term culturing could not eliminate persistent infections [141].

The effects of long-term culturing on TBE viruses has been studied at the Moscow Scientific Research Institute of Viral Preparations. Culture conditions played an important role in the properties of some mutant strains, and others maintained their properties unchanged even under prolonged culturing and varying temperatures. Some strains developed the ability to destroy SMH and chick fibroblasts after adaptation [17]. The laboratory of V. V. Pogodina of the Institute of Poliomyelitis in Moscow has investigated the variable pathogenicity (virulence) of TBE and related strains for different laboratory animals under varying conditions. Various strains of TBE, Langat, Omsk fever, Louping ill, Powassan, and Kyasanur forest fever viruses were studied for both intracerebral and peripheral pathogenicity in attempts to use neurovirulence as a strain marker. They observed the following types of neurovirulence: a) high intracerebral and high peripheral--Eastern and Western TBE strains, and Omsk fever, Kyasanur, and Powassan viruses; b) low intracerebral and high peripheral--Khab-9 and Vasenkova strains (EEE); c) high intracerebral and low peripheral--Fatayev and Ix-2 (TBE); and d) low introcerebral and low peripheral--Langat strain TR-21, recommended as a vaccinal strain. Mice and hamsters were judged unsuitable for differential diagnosis of the TBE complex since they displayed uniform clinical symptoms with all strains. Lambs were ruled unsuitable because of their low susceptibility. While none of the animals tested were equally susceptible to all the strains, newborn pigs were the most suitable for differentiating strains on the basis of virulence [178, 177].

When a newly isolated TBE strain was injected into young mice and passaged, its virulence decreased. Specific resistance to challenge by the original wild-type virus was produced by injection with this attenuated strain; degree of immunity was affected by virus dose and time of immunization. The lowered virulence was connected with a decrease in the ability of the attenuated virus to multiply in extraneural tissue [107, 143, 179]. Since titration on the basis of cytopathic effect gave inconclusive results [180], the fluorescent-antibody method (FAM) was

employed in the tissue-culture studies of growth stages, of the appearance of viral antigen, and of cytopathic effects of Langat (strain TR-21) virus, a weakly virulent virus demonstrating antigen visually.

C. Induced Mutation of TBE Viruses

G. D. Zasukhina and I. A. Rapoport reported on the chemical mutagenesis of TBE viruses. General studies of the variance in hereditary characters resulting from treatment with various chemical mutagens produced mutant strains of varying virulence and morphology [286]. Changes in cytopathic effect in tissue culture were not connected with cytopathic effect in cell cultures treated with 5-bromouracil, formaldehyde, urethane, and a combined proflavin-urethane preparation [285]. In the work of Zasukhina and Rapoport, the effects of some standard mutagens on two groups of arboviruses with characteristically low and high mutation rates are compared. Strains of TBE virus with a characteristically low mutation rate and WEE strains with a higher mutation rate, better culturing properties, and a faster growth rate were treated with: 1) 5-bromouracil, 2) formaldehyde, 3) 1,4-bisdiazoacetylbutane and 4) N-nitrosomethylurea. These mutagens produced alkylation of the hereditary material; 1, 2, and 4 yielded a greater percentage of apathogenic mutants than did 3. A greater number and variety of mutations were produced by 1,4-bisdiazoacetylbutane. These results were highly significant in explaning "zoclogical cosmopolitanism," or ability of these viruses to survive in dozens of species of cold and warmblooded animals. These animals are the reservoirs, carriers, and victims of these viruses. A secondary aspect of the study was to determine the range of artificially induced mutant properties of these viruses with the intention of creating live vaccine strains from strains with induced mutation. Several strains were selected for further study [287].

D. Diagnostic Methods for Tickborne Encephalitis

The fluorescent-antibody method

The principal advantages of the fluorescent-antibody method (FAM) in diagnostics are speed, accuracy, and the saving in reagents [128, 145, 156]. This method has

been employed to detect cell-bound and free TBE viral antigens in sheep-kidney cultures [129], and shows the intracellular distribution of nucleic acids and specific antigen in mouse-brain and sheep-embryo kidney tissue [220, 219]. This method has been used diagnostically and in the study of the course of experimental infections. It is easily and rapidly detectable in the central nervous system and lymph nodes soon after infection, usually within 24 hours. Viral antigens are easily demonstrable even in animals showing no clinical symptoms [83, 146].

Complement fixation reactions

Complement fixation is repeatedly cited as one of the best methods for diagnosing TBE (though the FAM is superior) [64, 54, 150, 39]. Its principal disadvantages, the length of time required to obtain definitive results (as much as 15--30 days) [64, 103] and the relatively sophisticated equipment required, make hemagglutination more acceptable [63]. A method by which dried blood on filter-paper disks is used was ruled unsuitable for the complement fixation reaction because of the large titers of anticomplementary substances in the dried blood [54]. However, this system is adaptable to the neutralization reaction [54], although in most papers on neutralization, it is carried out *in vitro* or in tissue culture [255]. The principal advantages of either fast neutralization or complement fixation is the elimination of mice. Also, since the virus multiplies faster in tissue culture than in mice, virus can be obtained, identified, and typed more rapidly [64]. Several papers report the processes of obtaining and purifying sera for complement fixation [150, 266, 58, 38].

Hemagglutination and hemagglutination-inhibition reactions

Hemagglutination and hemagglutination inhibition have been used diagnostically in large-scale serological surveys and epidemiological studies both in the field and in tissue cultures [276, 95, 126, 200, 171]. Sheep-embryo kidney cultures provide the most suitable medium for hemagglutination and for complement fixation, although use of other tissues is reported in the literature [62, 96, 223, 47, 53]. TBE hemagglutinating antigens obtained from viruses grown in various tissue cultures are highly specific, require no elaborate purification process, and are stable at 4°C. They were therefore recommended to

replace brain-derived antigens for serodiagnosis of TBE. The accumulation of virus in the culture media can be determined fairly accurately by hemagglutination and TBE virus can be detected in experimental mixed infections in tissue culture [150]. A modified hemagglutination-inhibition (HI) reaction is widely used in the Soviet Union in surveys of known and suspected vectors [201, 171, 275, 97]. One method, which enables a technician to determine the presence of TBE and Japanese encephalitis antigen without the complement-fixation reaction, involves the simultaneous performance of the HI test over a wide pH range, since the Japanese and TBE viruses agglutinate at different pH values [247]. A further modification of this test suitable for large-scale work employs paper discs and requires minute blood samples [201]. Since antigens are plentiful in the blood long before the appearance of clinical symptoms, Gaydamovich and others have recommended the HI reaction for early detection of arboviruses and suggest its use in the identification of vectors [67]. Use of this reaction to demonstrate the presence of TBE antigen in wild birds and their parasites is particularly interesting as it enables contacts of wild birds with epidemic foci to be revealed [171].

A modified precipitation reaction was chiefly used in typing and determining antigenic relationships rather than in diagnosis [224].

Neutralization

The chief benefits of neutralization methods have been found to be that clear-cut results could be obtained within 72 hours with freshly isolated strains and with convalescent sera; even sera contaminated by bacteria could be used and the tests could be carried out in ordinary culture bottles without impairing sensitivity [255, 131, 52]. Disadvantages were such external factors as season [274]; also, clinical manifestations in a given individual affected the neutralization indices so that a definite hemagglutinin-forming dose could not be determined accurately [255, 20]. This method could be used to detect infectious RNA in the course of an investigation of the properties and functions of TBE virus RNA [49].

A colorimetric test for TBE has been used experimentally with success; its only disadvantage is that definite results may be obtained only after 4--5 days. Further research on this test is underway [93].

Plaque formation has been used in the differential diagnosis of TBE because its plaques are distinct from those formed by other viruses. In one experiment, TBE virus formed large turbid plaques, Omsk fever virus formed small plaques, and Langat virus (strain TR-21) formed both large and small transparent plaques, indicating the heterogeneous composition of the inoculating strain [122]. Standardization of conditions is very important since agar inhibitors also alter plaque sizes [51]. Positive identification may be made in 3--4 days using a method reported by Logina-Parina in 1964 [121]. The infectivity of TBE infective RNA can also be shown by the plaque technique [50].

E. TBE Therapy

1. Vaccines

A 5% brain vaccine against TBE was administered to mice and guinea pigs. This vaccine was prepared from serum obtained from infected animals two or four days after infection, and was administered in two doses 28--32 days apart. When an allergic reaction appeared, the animals received normal brain suspensions or formol-inactivated vaccine as desensitizers. In guinea pigs, tissue from sick mice and from infected mice which had not yet displayed clinical symptoms produced strong anaphylactic reactions. Four-day vaccine caused only a weak response, leading to the conclusion that intermediate antigens appeared between the second and fourth day after injection [13].

A nonallergenic, formolized vaccine was obtained by Gagarina et al. by the intracerebral infection of newborn rats. Similar vaccines have been obtained by others [60, 83, 115, 260]. Vaccines adsorbed on aluminum hydroxide possessed greater immunogenicity than native vaccines [115].

Vaccines prepared from tissue cultures were generally more effective and easier to handle and store, and were areactogenic as compared to inactivated brain vaccines. In general, greater postinfection immunity was observed with the tissue-culture vaccines [43, 202, 258]. Rates of antibody accumulation and immunological shift varied during large-scale trials. High antibody titers appeared rather early [44] in some previously unvaccinated persons and after considerable delay in others, suggesting to the

researchers that threee immunizations were optimal. Large-scale trials bore this out, leaving the question of the optimum intervals to be determined [259]. The immunizations last at least six months [257, 46]. In trials with human volunteers, Chumakov and his associates found that maximum immunogenicity was obtained when shots were given 1--4 days apart followed by a booster after six months, especially in tests of nonadsorbed vaccines [46].

Attenuated vaccines prepared in tissue cultures were more effective than brain vaccines in almost every case, though their effectiveness was affected by such external factors as drugs and hormones [42, 199]. It has been established that the regional lymph system limits the penetration of tickborne encephalitis virus into the bloodstream under experimental conditions [132]. Cortisone treatment of mice at the time of immunization did not improve the prophylactic effect of the vaccines; on the contrary, viremia lasted longer in animals receiving cortisone [98, 253]. X-irradiation speeded the spread of TBE virus through the regional lymphatic system except in the lungs, where a decrease in virus titers was noted [130]. Urethane-barbital preparation had much the same effect as cortisone on experimental TBE infections in mice, with viruses persisting longer and in higher titers [199]. A tissue culture vaccine effective against both eastern and western forms of the TBE complex and possibly against related diseases and which possesses almost the same virus-neutralizing capacity for all the diseases of the TBE complex was developed at the Institute of Poliomyelitis in Moscow by Zaklinskaya and coworkers [283].

Antisera and specific globulins have been found the most suitable for use in epidemic foci because of their areactogenicity and because they are easily obtainable [57, 182]. A-type immune serum against tickborne encephalitis is specific, shows no anticomplementary activity, and contains no antibodies to brain tissue; it can be used as a standard in complement-fixation and hemagglutination-inhibition tests with TBE antigen [194].

STORAGE PROPERTIES OF TBE VACCINES

Of the wet vaccines, formol-inactivated vaccines were the most stable, with a shelf life of up to 9 months. Some batches were kept in rubber-stoppered common glass bottles up to one year [35, 83, 198]. Dried vaccines kept longest, provided residual moisture did not exceed 1% [125].

Studies of the properties of viral infection in tissue culture have been made in the laboratory of J. Vilcek in Czechoslovakia. Several reports on the formation, antiviral action, and comparative properties of various interferons have been published. When mice are infected with TBE intraperitoneally or intracerebrally, high interferon levels are found in the brain of inoculated animals [269]. When cells infected with WEE, EEE, vaccinia, NDV, and homologous TBE viruses were treated with interferon from TBE-infected cells, their resistance to the other diseases increased [267]. The action of TBE-interferon and influenza-interferon was compared; results were found to be similar to those of the previous study, indicating that the specific inducing virus fails to influence the properties of the interferon formed in a given cell culture [70, 185, 268].

The following chemicals and other preparations have been more or less successfully tried as decontaminants and therapeutic compounds for virus diseases in the Soviet Union: Lactams and lactones, especially beta-propiolactone, were recommended for general disinfection use and for further study [173, 293]. Novembichin and other antibiotics were somewhat effective [28, 73]. Dichloroethylamines showed antiphage action and ethyleneimines inhibited the action of many viruses [27, 29, 288]. Naturally occurring, interferon-like inhibitors in both live animals and in tissue cultures have been reported in many papers. Most of them are enzymatic and thermolabile [147, 217, 228, 246, 250, 292].

Uniformly satisfactory results have been obtained with the administration of vaccines, drugs and therapeutic chemicals by means of aerosols [4, 5, 6, 7, 66, 77, 183. 187, 270, 271, 289, 290]. In fact, some live, attenuated vaccines are most effective when administered by aerosol in very small quantities [66].

A killed tissue vaccine prepared from TBE virus strains Yas-8 and Ix-10 was tested on animals kept in a IVK-2 chamber. Vaccinations were given at 1-, 3-, 5-, 7- and 10-day intervals via an aerosol with particles averaging 1--3 microns in diameter. This method produced a rapid rise in virus-neutralizing antibody titer and successfully protected animals challenged with the virus. The vaccine penetrated the tissue rapidly, enabling smaller doses to be used. A mixed aerosol conferred immunity to both viruses (TBE and WEE) [250].

2. Challenge of Animals Vaccinated Against Tickborne Encephalitis

There are numerous reports of challenge tests of vaccinated animals to determine the efficacy of certain methods of immunization and the properties of experimental vaccines. In a study to determine the conditions influencing the effectiveness of TBE prophylaxis in human volunteers and the relationship of the immunogenic properties of the vaccine and its immunologic effect, 548 persons, all previously unvaccinated, received doses of vaccine at 1--2 and 2--3 week intervals. They were revaccinated after 1 year. Twelve types of tissue culture vaccine and three types of brain vaccine were tested. Conclusions reached were that if the first series of shots possessed highly immunogenic properties, then a booster possessing diminished immunogenicity was effective. The reverse was not true [45].

Some of the standard vaccines, particularly the mouse-brain vaccine, are easily contaminated by bacteria and produce allergic reactions. Thus, tissue-culture monolayers, especially chick-embryo cultures, are considered a superior source for vaccines. Formalin or beta-propiolactone were used as neutralizers to make the vaccine suitable for use. Optimum inactivation conditions were determined. A satisfactory vaccine was prepared by inactivation at 4°C. (This was necessary because the 37°C temperature of some methods destroyed the immunogenicity of the virus). This vaccine had a shelf life of approximately 6 months and protected challenged mice against high concentrations of virus. In tests on humans with low or nonexistent serum-antibody titers, 66% of volunteers developed antibodies in sufficiently immunizing titers within 4 weeks after vaccination [84, 127].

Airborne infection of monkeys with TBE virus produced little CNS involvement, but other symptoms produced were like those evoked by infection from other routes [23, 114]. In two studies the infective dose for aerosol infection was found to be 10^4--10^5 i.c. mouse LD_{50}. In both cases, active immunization with TBE vaccine was the best way to protect test animals against high infectious titers [23, 48]. Airborne infection is an unusual route and occurs mainly, or perhaps entirely, in the laboratory. In these studies animals were kept in a special flow chamber and aerosols were generated by a specially developed appara-

tus which generated particles with average diameters of 0.75--1.5 microns. The dose could be varied by altering the concentration of virus in the carrier fluid or by varying exposure time. A Formol vaccine offered animals better protection against aerogenic infection than against infection by other routes [48].

F. Japanese B Encephalitis

Virological surveys have shown birds to be an important factor in the dissemination of Japanese B virus. A survey of the southern Primor'ye showed the presence of hemagglutinating and complement-fixing antibodies in 200 wild birds of 36 species [166, 181]. Sheep-embryo kidney tissue culture is the most widely used medium for the evaluation of cytopathic effect in the diagnosis of the disease since no preliminary adaptation is required. The cytopathic effect is limited in adult tissue cultures [61, 165]. attempts to culture the virus in guinea-pig tissue involve the nece sity of intracranial infection of the initial animal with a suspension of infected chick tissue, and intractanial subculturing. This laborious procedure yields a preparation with unchanged antigenic properties after long passaging [197]. Noninfectious diagnostic sera and hemagglutinins for the HI test have been produced [68, 237]. Uvarov and his associates prepare concentrated hemagglutinins by precipitation in ammonium sulfate and incubation at pH 3.2--8.5 for 19--24 hr at 0--4°C [264].

G. Omsk Fever and Related Diseases

Omsk fever and other renal hemorrhagic fevers present diagnostic problems similar to those surrounding the identification of various forms of the tickborne encephalitis complex. In addition, Omsk fever and Kyasanur forest disease are antigenically related to tickborne encephalitis. Hemorrhagic nephroso-nephritis (HNN) and Omsk fever are often misdiagnosed as leptospirosis, tickborne encephalitis, gastroenteritis and other diseases. The tables compare the characteristics of HNN and related diseases and abdominal conditions for which it is most often mistaken.

Table I from [216]

COMPARATIVE CLINICAL CHARACTERISTICS OF HEMORRHAGIC FEVERS

Hemorrhagic nephrotic nephritis	Crimean hemorrhagic fever	Central Asian hemorrhagic fever	Omsk hemorrhagic fever
Predominant clinical syndrome			
Distinct hemorrhagic manifestations and a severe general intoxication at the height of the disease, acute renal damage and urinary excretion impairment, sometimes acute renal failure.	Phenomena of general intoxication with distinct hemorrhagic phenomena and relatively mild neurological lesions.	Very severe general intoxication and distinct severe damage to the gastrointestinal tract, with massive, frequently critical bleeding	Relatively mild general intoxication and hemorrhagic diathesis. Distinct respiratory tract lesions.
Incubation period			
From 11 to 23 days. On the average 14-15 days.	From 2 to 25 days.	3-4 days. Especially short in intramural hospital infections.	2-4 days. Especially short in infections of personnel caring for infected laboratory animals.
Prodromal period			
Observed rarely. Lasting 2-3 days.	Prodromal period not manifested.	Prodromal period not manifested.	Rarely observed.
Cycles of development of the clinical picture of the disease			
Four periods of the disease: the first general febrile period. Second period – hemorrhagic manifestations. Third period of maximal injuries to organs. Fourth period – reconvalescence.	Three periods of the disease: the first initial period. Second period – height of the disease. Third period – reconvalescence.	Three periods of the disease: the first initial period. Second period – height of the disease Third period – reconvalescence.	Two periods of the disease: the first, febrile period Second period – apyretic, reconvalescence.
Temperature often rises suddenly to 39-40°C and remains high until the 4th-7th day of the disease. Later resolving by lysis in 2-3 days	Temperature rises suddenly to 39-40°C and then resolves by lysis after 7-8 days. A characteristic brief drop in temperature on the 3rd and 4th days of the disease coinciding with the beginning of the hemorrhagic manifestations.	After a severe chill the temperature rises suddenly to 39-40°C and drops somewhat on the 3rd or 4th day (with the beginning of hemorrhagic manifestations). Later it remains at a level of 37-38°C to the 7th-8th day of the disease and later returns to normal by lysis.	After a brief chill temperature rises suddenly to 39-40°C. It resolves by lysis between the 9th and 15th day of the disease. A brief decrease on the 3rd or 4th day, (beginning of hemorrhagic manifestations) is characteristic. In 5% of cases in the second or third week of the reconvalescent period there is a typical secondary temperature wave (short-lived, not so high).

Table I continued

	Hemorrhagic nephritic-nephritis	Crimean hemorrhagic fever	Central Asian hemorrhagic fever	Omsk hemorrhagic fever
Color of skin	Typical hyperemia of the skin of the face, neck and upper half of the body from the first hours of the disease and until the reconvalescent period.	Typical hyperemia of the skin of the face, neck and upper half of the body from the first hours of the disease and to the reconvalescent period.	Hyperemia of the face not distinct.	Hyperemia of the skin of the face and the upper half of the body observed in 50% of cases from the first hours of the disease and until the reconvalescent period.
Color of visible mucous membranes	Typical hyperemia and injection of the vessels of the sclerae, conjunctiva and oral cavity from the first hours of the disease and until the reconvalescent period.	Typical hyperemia and injection of vessels of the sclerae, conjunctiva and oral cavity in the initial period and during the height of the disease.	Hyperemia of the sclerae, and of the pharynx or tonsils was rarely observed.	Hyperemia and injection of the vessels of the sclerae, pharynx and oral cavity during the febrile period.
Pulse	Moderate bradycardia during the first three periods of the disease. Relative tachycardia from the beginning of the reconvalescent period.	Moderate bradycardia during the period of high temperature.	Pulse rate corresponding to temperature. In severe disease courses with massive blood loss there is tachycardia.	Moderate bradycardia in the febrile period. Sometimes tachycardia.
Blood pressure	Most frequently moderate hypotension - 80-100/50-60; severe hypotension (collapse) or hypertension are rare.	Typical moderate hypotension - 90-100/50-60.	Typical distinct hypotension. - 80-90/40-50. Degree of hypotension directly proportional to the degree of loss of blood.	Typical distinct arterial hypotension. - 80-90/40-50 during the entire febrile period.
Hemorrhagic manifestations a) on the skin	From the 3rd-4th day there is a slight petechial rash on the skin of the lateral surfaces of the chest, abdomen elbow, armpit; more rarely a widely distributed rash is noted. There is no roseolar rash.	From the 3rd-4th day of the disease there is a small scattered petechial rash on the skin of the anterior and lateral surfaces of the chest and abdomen. There may also be a roseolar rash during the same time and with a similar localization.	A slight petechial rash appears in the first to fifth day of the disease. It is seen mainly on the skin of the anterior surface of the body and limbs. The rash may spread over the entire body with exception of the face. Some petechiae may reach 3-4 cm in diameter.	A slight petechial scanty rash is seen only in 20% of patients, in the skin of the anterolateral surfaces of the body and limbs. Sometimes coalescent hemorrhages appear in the lumbar region.

Table I continued

	Hemorrhagic nephrotic-nephritis	Crimean hemorrhagic fever	Central Asian hemorrhagic fever	Omsk hemorrhagic fever
b) In the mucous membranes	From the 3rd-4th day of the disease there are hemorrhages in the sclerae, mucous membrane of the oral cavity, and especially at the edges of the hard palate. Hemorrhages from the nose, gums and gastrointestinal tract are rare and mild.	In 50% of cases there are no hemorrhages from the nose. Hematemesis and intestinal bleeding are rare and last 3-4 days. Copious hemorrhage occurs only in 10-15% of patients.	Typical copious hemorrhages from the nose and gums. In 50% of cases there are hematemeses and melena, which often endanger the life of the patient.	Bleedings from the nose, gums, uterus, gastrointestinal tract, etc. are infrequent and mild.
Renal function	Marked decrease in diuresis (100-300 ml) sometimes to complete anuria in the second and third period of the disease, with development of acute renal failure. During the reconvalescent period there is a distinct and prolonged polyuria and isohypostenuria.	No distinct impairment of diuresis is observed.	No impairment in diuresis.	No impairment in diuresis.
Urine changes	Typical albuminuria during the entire period of the disease. In the second and third periods (4th-9th day) it is very high, reaching 10‰ and sometimes even 40-80‰. In the sediment there are the following findings: early (2nd-3rd day) appearance of large numbers of cells from the renal epithelium with signs of degeneration, copious cylindruria and hematuria of varying degree.	In the period of the height of the disease the following are typical: moderate up to 1‰ albuminuria, microhematuria and few hyaline casts.	In the period of the height of the disease there is often a moderate albuminuria, and in the sediment of the urine there are a few hyaline casts and fresh erythrocytes.	Findings in the period of height of the disease include: a slight (up to 1‰ albuminuria, renal epithelial cells, and few hyaline casts

Table I continued

	Hemorrhagic nephrotic nephritis	Crimean hemorrhagic fever	Central Asian hemorrhagic fever	Omsk hemorrhagic fever
Pain in the renal region	Regular early appearance and distinct manifestations of the Pasternatskii sign in all periods of the disease, and of a typical tender point in the lumbar region on palpation	In the period of the height of the disease frequent occurrence of a positive Pasternatskii sign	In the period of the height of the disease the Pasternatskii sign may be observed only in few patients.	In some patients the Pasternatskii sign may be weakly positive in the period of height of the disease
Blood changes: a) hemoglobin and erythrocytes	Typical hemoconcentration from the first day of the disease ... In the reconvalescent period there is some decrease in hemoglobin and in the number of erythrocytes, usually to the lower normal limits.	Hemoconcentration as typical in the first days of the disease. In the last days of the period there is a reduction in the number of erythrocytes and in the hemoglobin level. In some patients with severe bleeding a distinct anemia may develop (hemoglobin to 50-40%, and erythrocytes to 3,000,000/mm^3).	In the period of the height of disease there is distinct hypochromic anemia. In some patients hemoglobin may fall to 20-25%, and the number of erythrocytes to 1,000,000/mm^3 or lower.	In the first days of the disease there may be a slight hemoconcentration. In the second half of the febrile period the hemoglobin level and erythrocyte count decreases somewhat.
b) the number of leukocytes and the leukocyte formula	Typical: 1) initial leukopenia = 2,000-4,000/mm^3 in the first period (1-3 days), 2) subsequent leukocytosis most frequently 10,000-12,000/mm^3 and sometimes a subleukemic level of 35,000 and even 50,000/mm^3, 3) increase of the number of leukocytes to normal only in the reconvalescent period, 4) in the first days of the disease on the even still in the presence of low or normal neutrophilia with a distinct or slight shift to the left to young forms, and appearance of [illegible]	Findings in the period of the height of the disease: distinct leukopenia (2,000-4,000), slight neutropenia with a moderate bandform shift, anesinophilia and appearance of plasma cells.	Findings in the period of height of the disease: distinct leukopenia (to 1,300-2,000/mm^3), considerable neutropenia (35-45%) with a shift to the left, sometimes with juvenile cells, relative lymphocytosis and anesinophilia	Findings in the period of height of the disease: considerable leukopenia (3,000-5,000/mm^3), sometimes very severe (as low as 1,200-1,400), slight neutropenia with a bandform shift to the left, relative lymphocytosis, anesinophilia, appearance of plasma cells in some cases

Table 1 continued

	Hemorrhagic nephrotic nephritis	Crimean hemorrhagic fever	Central Asian hemorrhagic fever	Omsk hemorrhagic fever
	philia; b) appearance in the peripheral blood of plasma cells, frequently as high as 10% and more			
c) Number of thrombocytes	In the [illegible] (the 3rd-[illegible] the disease [illegible] a brief and moderate thrombopenia (to 80,000-100,000).	In the period of the height of the disease there is a moderate thrombopenia (60,000).	In the period of the height of the disease a moderate thrombopenia (60,000), but sometimes a much more severe one (30,000).	In the period of the height of the disease, a slight thrombopenia.
d) ESR	Typical slow ESR in the first three periods and a moderate acceleration in the reconvalescent period (to 20-30 mm/hour).	Typical slight acceleration of ESR towards the end of the period of height of the disease (to 20-30 mm/hour).	Typical ESR to 30-55 mm/hour during the period of height of the disease.	Slight slowing down of ESR in the febrile period and acceleration during the reconvalescent period (to 20-30 mm/hour).
Respiratory system lesions.	Atypical changes. In the first period there is a slight diffuse bronchitis in some patients. At the end of the serous period and in the third period focal pneumonia may develop as a complication in some cases.	In the period of height of the disease an acute diffuse bronchitis may develop. At the end of the period of height of the disease focal pneumonia may develop in 10% of cases.	In some patients in the period of height of the disease a diffuse acute bronchitis may develop.	From the first days of the disease there is an acute bronchitis, and in 31% of cases specific focal pneumonia is noted. At the end of the febrile period a bacterial focal pneumonia may appear as a secondary complication.
Gastro-intestinal tract lesions.	From the 3rd-4th day of the disease there is nausea, persistent vomiting, less frequently hiccups, epigastric pain and tenderness on palpation. The odor from the mouth is unpleasant. Hematemesis and blood in the stools are rare. Gum bleeding is rare. In some cases in the second and third period of the disease (4th-9th day) a clinical picture of "acute abdomen" may develop (hemorrhage-	From the first days of the disease there is a marked lack in appetite, and increasing thirst. Vomiting, often with blood, is common. There is a heavy putrid odor from the mouth. The abdomen is soft, often diffusely tender. Changes in the stools are typical. Tarry or blood-stained stools are rare.	From the first days of the disease there is lack of appetite and a putrid odor from the mouth. Gum bleedings are common. Vomiting is very frequent, sometimes almost constant. Hematemesis and repeated intestinal bleedings are common.	There is almost complete loss of appetite from the first days of the disease. Not infrequently a putrid odor from the mouth. Nausea and vomiting in 33% of cases. Soft abdomen, only slightly tender on palpation.

Table I continued

	Hemorrhagic nephrotic-nephritis	Crimean hemorrhagic fever	Central Asian hemorrhagic fever	Omsk hemorrhagic fever
	into the stomach and intestine wall, into the mesentery, pancreas and perirenal tissue)			
Liver and spleen	At the height of the disease the liver in 50 of cases may be palpated and is moderately enlarged. The spleen is rarely enlarged.	There is slight enlargement of the liver and spleen during the period of height of the disease, approximately in 33% of patients.	In the period of height of the disease the liver is usually considerably enlarged (palpated at 4 cm below the costal margin).	In the period of height of the disease the liver is slightly enlarged and tender to palpation. Enlargement of the spleen not usual.
Nervous system lesions	Changes regular. From the first days there is a severe headache in all patients. In 27.5% of cases from the beginning of the third period there is a marked state of stupor, mild meningeal symptoms, and weak pathological reflexes (Babinski and others). CSF is usually unaltered, the spinal fluid pressure is increased. One may observe distinct phenomena of serous meningitis. Rarely does one see a clinical picture of meningo-encephalitis with distinct impairment of consciousness - stupor, delirium, psychomotor excitation and sometimes coma.	From the first days there is headache, drowsiness, and sometimes impairment of consciousness, delirium and hallucinations, and there may be brief meningeal signs and signs of impairment of cerebrocranial innervation asymmetry of the face, deviation of the tongue, irregular pupils and pathological reflexes (Babinski and others). CSF is usually not altered.	From the first days there is headache, drowsiness and apathy. Rarely there may be a brief loss of consciousness and in severe cases a comatose condition. Meningeal phenomena and disorders of tendon reflexes are rare and not distinct.	From the first days of the disease the following signs appear: headache, limb pains. Manifestations of organic nervous system lesions (pathological reflexes and meningeal signs) are rare, brief and not distinct. In the Bukovinian variant of hemorrhagic fever the injury to the nervous system is more distinct. The following signs are very frequent: brief psychomotor excitation, anisoreflexia, appearance of pathological reflexes. In one third of the cases there are meningeal signs

Table I continued

	Hemorrhagic nephrotic-nephritis	Crimean hemorrhagic fever	Central Asian hemorrhagic fever	Crisis hemorrhagic fever
Metabolic disorders	At the height of the disease (second and third period) the following are typical: some hypoproteinemia, distinct azotemia, frequently, high (up to 200-300 mg% of residual nitrogen and 400-500 mg% of urea), acidosis and decrease of alkali reserves of the blood to below 50 volume % (sometimes as low as 20 volume %), moderate chloropenia, distinct hypocholesteremia, pathologically high and persistent sugar curve.	Metabolic disorders are rare. At the height of the disease and during the first days of the reconvalescent period there may sometimes be moderate azotemia.	At the height of the disease there is a moderate hypo[illegible] ([illegible]), mainly due to decrease in globulins and fibrinogen. During this time there is a regular tendency to a moderate hypoglycemia. A considerable decrease in the ascorbic acid in the blood is typical.	Changes in metabolism not regular. At the height of [illegible] one observes only a moderate hypoproteinemia and some times slight azotemia.
Complications	One rarely observes massive hemorrhages in the kidney (and tear of the kidney) and in the epirenal parenchyma, with development of a clinical picture of "acute abdomen". Hemorrhages in the mesentery and the wall of the intestines with development of an ileus syndrome; hemorrhages into the stomach and other internal organs; acute insufficiency of the kidneys and development of a clinical picture of azotemic uremia, focal pneumonia, purulent parotitis and submaxillitis.	Massive bleedings (gastro-intestinal, pulmonary) very rare. Focal pneumonia observed in 10-16% of cases. In some patients parotitis, epididymitis and peritonitis develop.	Massive bleedings from the gastro-intestinal tract are very frequent and are a danger to life. In some cases a deep focal pneumonia develops. One very rarely observes inflammation of the salivary glands.	Focal pneumonia both early (viral) and late (bacterial) are very frequent. Otitis, parotitis and pielitis develop rarely.

Table II from [216]

Differential diagnostic signs of HNN and 'acute abdomen"

Signs and combinations of signs	Clinical characteristics	
	HNN	"acute abdomen"
Features of abdominal pain	Abdominal pain appears on 3-5th day	Sudden onset of pain – the fust clinical sign of onset of pathological condition (gastrointestinal perforations, acute peritonitis)
a) origin		
b) intensity	Usually mild pains, never intractable ("knife stroke")	Very acute pains ("knifing") frequent
c) localization	Most frequently localized in epigastric region but may also be diffuse	Most often in epigastric region, but may also appear elsewhere
d) combination with vomiting	Pains usually precede vomiting	
e) combination with fever	Abdominal pains usually preceded by typical high temperature reaction	Pains usually begin while temperature still normal, temperature later rises
Combination of abdominal pains with other pain	Abdominal pains usually combined with pains in the lumbar region	Lumbar pains only when a gastroduodenal ulcer penetrates into the pancreas, in nephrolithiasis colic, or retroperitoneal appendicitis
Urine and diuresis changes	Characteristic	Not characteristic, occur rarely
Blood changes	Characteristic (see other tables)	At the onset of pain attack blood may be normal, with neutrophil leukocytosis developing later
Combination of pain syndrome with other clinical signs	Abdominal pain combined with various symptoms characteristic of HNN (hemorrhagic rash, renal injury etc.)	Abdominal pains dominate clinical picture, often typical clinical manifestations of acute peritonitis also appear within the first 12-24 hours

Table III from [216]

Differential diagnostic signs of HNN, mosquito-borne Japanese encephalitis and tick-borne encephalitis

Signs	HNN	Mosquito-borne Japanese (autumn) encephalitis	Tick-borne encephalitis (spring-summer)
Period of maximum morbidity	Maximum morbidity in autumn	August-September	April-July
Epidemic features	No traces of tick bites	No traces of tick bites	Traces of tick bite are of diagnostic value
Consciousness	Persists in most patients	Most often impairment, often coma	Various degrees of consciousness impairment
Meningeal signs	Rarely observed, approx. in 5% of cases	Usually observed, distinct	Usually observed, distinct
Encephalitis, pathological reflexes	Rarely observed, approx. in 5-10% of cases, usually disappears rapidly	Observed as a rule, tonic convulsive character, flaccid, central paralyses (hemiparesis), bulbar disorders	Observed as a rule. Weak, atonic paralyses of neck muscles and thoracic region, bulbar disorders, spastic pareses - less frequent
Cerebrospinal fluid	Usually not - Approx. in 5% of cases moderate rise in protein, pleocytosis and very rarely bloody liquor	Changes always observed: During first days a rise in cell numbers, later - an increase in protein (up to 2%), distinct cytosis (up to 200 cells per 1 mm^3	Clear liquor, increased pressure and protein (up to 2%) Globulin reactions positive, pleocytosis - the prevalence of lymphocytes
Blood changes	See above (other tables)	Moderate leukocytosis with a neutrophil shift to the left, ESR accelerated	Moderate leukocytosis, neutrophilia, aneosinophilia. ESR accelerated
Urine and diuresis changes	Characteristic changes (see above)	Changes not characteristic, sometimes traces of protein	Changes not characteristic, sometimes traces of protein

Table IV from [216]

The most important signs of the main forms of viral endemic hemorrhagic fevers (scheme of M.P. Chumakov, elaborated on by A.A. Smorodintsev)

Main indexes	Hemorrhagic fevers					
	HNN	Crimean	Central Asian	Omsk	Kyasanur Forest disease	Argentinian
I. Properties of the virus						
Cultivation outside the human body	-	-	-	+	+	+
Experimental infection in white mice	-	-	-	+	±	+
Experimental infection (febrile reaction) in monkeys	-	+	-	+	+	+
Antigenic relationship to tick-borne encephalitis virus	-	-	-	+	+	-
Susceptible animals with clinical (cl) or subclinical (subcl) form	Vole	?	Rabbit (subcl)	White muskrat (cl), mouse (cl)	White mouse (cl), monkeys (cl)	Guinea pig (cl), white mouse (cl,
II. Epidemiology						
Seasonality	Polyseasonal	Spring-summer	Spring-summer	Spring-summer	Summer-autumn	Autumn-winter
Role of ixodid ticks as carriers and vectors of the disease in nature	-	+	+	+	+	-
Participation of Gamasoid mites in the circulation of the virus in mice-like rodents	+	-	-	-	-	+
Transmission of the virus to man by rodents or their ectoparasites	+	-	-	-	-	+
III. Clinical picture						
Incubation period (days)	11-24	2-4 (M.P. Chumakov), 7-10 (E.A. Gal'perin)	3-4	3-7	4-8	9-14
Diphasic temperature curve	-	+	-	-	+	-
Diphasic fevers	-	-	-	+ !	+	-
Nasal and uterine bleeding	+	+	+	+	+	-
Gastrointestinal bleeding	±	+	++	±	-	+
Severe renal pathology	++	-	-	-	-	+
Hemorrhagic rash	+	+	++	-	-	-
Condition deteriorating after decrease in temperature	++	-	-	-	-	-
Leukocytosis and increase in number of Türk's cells	+	-	-	-	-	-
Leukopenia, shift of blood formula to the left	-	+	+	+	+	+
Lethality (%)	3-5	3-5	10-30	0.5-3	4.6	18
IV. Main preventive measures						
Vaccination	-	-	-	+	+	+
Deratization and disinfection	+	+	+	-	-	+

Most cases occur in the fall and early winter (October and November) and blood in the urine has been reported in all cases [18, 278]. Chicken erythrocytes, the aldolase reaction, and special complement-fixing antigens have been tested as diagnostic media. L. A. Vereta and T. P. Yur'yeva reported on the demonstration of complement-fixing antigen in Omsk-fever patients when convalescent serum was the antibody source. The antigen was detectable up to the twelfth day after infection and could be demonstrated both *in vitro* and in infected tissue culture from reactions produced by yellow fever and several simian viruses [265]. Since the lytic reaction was clearly demonstrable in only 57--60% of test cases, it was recommended as an auxiliary test rather than for differential diagnosis [87, 144]. Results of the aldolase reaction proved entirely satisfactory for the differential diagnosis of HNN [204]. Since viremia was present in animals with an experimental infection for 23 days, it was concluded that apparently healthy animals or convalescing animals were the principal vectors of the disease in an epidemic area [284]. Omsk-fever virus produces an extensive cytopathic effect in susceptible swine-embryo kidney cultures; RNA-containing inclusions and viral antigen are easily demonstrated by the FAM [94].

Serotherapy methods were compared by Rodin et al. and were found to be only moderately effective [190].

In general, diagnosis of HNN is difficult as the clinical sumptoms are so similar to those of other diseases and because, when the disease is suspected, comfirmatory diagnosis is difficult and time consuming. Smorodintsev [216] suggests that, in view of these difficulties, the patient should be questioned extensively as soon as possible so that his contact with vectors may be established or disproved. Hemorrhagic fevers are naturally focal diseases with foci in the Rostov, Bulgarian, Western Siberian, Khabarovsk, Moscow, and Amur regions [18, 30, 88, 172, 277, 278]. High humidity and the proximity of the population to swampy areas affects the mortality rate [18]. Mild cases may be undetected or misdiagnosed, while acute cases may be fatal [278]. The red field mouse, rats, other mice, voles, and muskrats have been carriers in various epidemics and an increase in the forest-mouse population seems to herald outbreaks. Because of the diagnos- and therapeutic difficulties, extensive prevention involving frequent land clearing and vigorous antirodent programs is practiced [88, 277, 278].

II. HOOF-AND-MOUTH DISEASE

Hoof-and-mouth virus enters the bloodstream rapidly, penetrates organs, and disrupts normal hematopoiesis. Changes in virulence were found to be linked to changes in penetration properties and multiplication capacity. Viruses whose virulence has been attuated by passaging penetrate the blood and organs less easily and multiply with difficulty [78, 272].

Investigations have shown that various tissue cultures are suitable for the cultivation of virus for diagnostic and vaccinal use. Bovine epithelium [148, 243], swine kidney, and newborn rabbit tissues [102, 206, 235, 245] have all proven satisfactory for these uses. Foot-and-mouth virus has a complex immunological structure and therefore, many diagnostic tests for the disease can be used [195]; these include complement fixation [155, 215], virus neutralization [242], and diffusion precipitation in agar [166]. Skomorokhov [215] recommends complement fixation, which can be used to evaluate vaccine potency.

Techniques for the preparation of virus-containing tissue which the Soviets have found effective are the use of Ascangel [24], chloroform [102, 272], freon [272], and the mincing of freeze-dried rather than wet tissues [116, 161]. A combined treatment with freon, n-butanol, and chloroform removed 98--99% of tissue proteins without lowering the original virus titer [272]. Adding the purified virus to fat-free milk and spray drying at 30-35°C is a convenient drying method. When stored, the virus had a shelf life of 1 year at 17--25°C when its residual moisture content was 6--9%. No change in storage properties was observed when the moisture content was reduced to 1.3--4.4%. This extra-dry preparation could then be stored at 37°C for 60 days without loss of activity [71, 161].

Attenuated and dry hoof-and-mouth vaccines have been successful in large-scale use. A dry adsorbed vaccine which is 99% effective had been tested on 3.5 million sheep as of 1963. An attenuated vaccine which protects up to 9 months is also in use [215]; the dry vaccines usually immunized for 2-6 months [117]. A dry vaccine prepared from strain L-III was tested on cattle. Its preliminary success and low allergenicity have recommended it for wider use [176].

III. RABIES, AUJESZKY'S DISEASE, AND POLAR MADNESS

Rabies and "polar madness" or "rage" (Tundra rabies) of arctic animals, especially foxes, and Aujeszky's disease or "pseudorabies" are viral diseases that affect wild animals primarily. Humans are susceptible to rabies and possibly to rage virus but not to Aujeszky's disease virus [254]. The table presents criteria for distinguishing rabies from Aujeszky's disease.

Table V
Differential diagnoistic criteria for Rabies and Aujeszky's disease

DIAGNOSTIC SIGN	RABIES	AUJESZKY'S DISEASE
Reaction of virus to drying	weakens	quite resistant
Location of virus in the body	nerves	blood and lymph
Infectivity of saliva	always	not in the absence of nasal discharge
Infectivity of blood	sometimes	yes
Behavior of virus on being heated to 60°	killed in 5-10 min	killed in 30-50 min
Babes-Negri bodies	present	absent - acidophilic inclusions seen in spinal ganglia of cattle
Incubation period	days to weeks	always short
Prodromal period	several days	absent, rapid onset of disease
Aggressiveness in the affected animal	marked	absent
Scratching	rarely	as in swine
Drooping of lower jaw	often	seldom
Quick death	seldom	often
Susceptibility of humans	yes	no
Oral infection	no	yes
Virus in the parenchymal organs	no	yes
Swallowing inedible objects	yes	no

Table V continued

Means of spreading the disease	biting	by contact and in food

Taken from: Orlov, F. M., Comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals) Moskva, Sel'khozizdat, 1963, 163-164.

"Rage" has been observed in wild and domesticated polar foxes [89, 90, 104, 105, 106, 235, 236], wolves, dogs, deer, bear, elk, and lemmings [235]. It is believed that the mortality rate is over 90% and that lemmings form a natural reservoir of this disease and spread it to foxes during their migrations [235]. These foxes probably infect domesticated dogs. Immunological and serological tests show that this virus is similar to but distinct from rabies and all other neurotropic viruses [89, 90, 104, 105, 235]. Specific antibodies to "rage" are found in the blood of foxes surviving an asymptomatic form of the disease [89]. No Babes-Negri bodies were observed in any case, although unidentified intracellular inclusions were found in fox neural tissue taken from experimentally infected animals [106].

One human victim has been reported [90]. In the Nov.--Dec. 1961 outbreak in the Yamal region, a child was bitten by a fox. The child died 25 days after being bitten, despite treatment with antirabies serum. Post-mortem examination of both the human and fox tissue revealed no Babes-Negri bodies; "rage" was therefore given as the cause of death. Serological methods employing complement-fixation and virus neutralization show that this virus is related to Aujeszky's virus and infectious equine encephalomyelitis virus as well as to rabies virus [235, 236].

No data on any diagnostic methods faster or more accurate than those mentioned have been discovered in the literature. Unconfirmed reports of the effectiveness of antirabies gammaglobulin in neutralizing this virus have been published; claims that preparations made from this virus will prevent rabies have also appeared [235]. Rabies vaccine will protect foxes against "rage" virus but no cure is known for the disease once the symptoms, similar to those of rabies, appear. Therefore, prevention of contact between wild and domesticated animals is the only effective

means known for checking the spread of the disease [235]. Animals whose winter rations contain added minerals possess slightly more resistance than animals fed a standard diet [235]. Wild and domestic rodents and their ectoparasites are considered the principal reservoirs and vectors of pseudorabies or Aujeszky's disease, and fleas and ticks are the actual mechanical vectors [254]. The carrier state can last as long as 100-130 days in fleas and the disease can run its full course in 2 days in livestock, dogs and cats [254]. This shorter incubation period is one of the signs that differentiates this disease from rabies (see Table V). The disease is sporadic, usually occurs in the fall, and generally kills young animals [254]. Bioassay, histology, and diagnosis by clinical symptoms are being replaced as diagnostic methods by the more rapid immune reactions, diffusion-precipitation tests and, most recently, the fluorescent-antibody method (FAM) [32, 101, 170, 222]. The diffusion-precipitation-in-agar reaction is rapid, inexpensive, and simple to perform. Its suitability for general use is subject to proof of a lack of additional nonspecific reactions [22]. To date, the FAM is the fastest and most accurate method; the appearance of viral antigen can be detected 2 hours after infection of a chick-embryo tissue culture [3]. The types of vaccines in use are: a specific gammaglobulin which is obtained by alcohol precipitation at low temperature [124], to which killed virus is added, a chick-embryo tissue-culture vaccine in which the virulence of the virus is decreased by long passaging [213, 242], a similar vaccine prepared from virus passaged on mouse tissue [242], hyperimmune serum, brain homogenate [254], and a vaccine prepared in Czechoslovakia from a weakly virulent, freshly isolated strain [214]. The last vaccine, still experimental, was announced in 1964. The virus was suggested as a possible vaccinal strain; if it is, the need for long passaging [87] to obtain sufficiently attenuated virus would be eliminated. Challenging vaccinated laboratory animals with the wild-type virus showed the efficacy of all the vaccines tested. In addition, specific gammaglobulin alone protected newborn pigs with an immunity that lasted for three weeks [124, 4]. Passaged virus was used in large-scale tests and was the most effective among thousands tested. Only a few animals died [213]. "SUCH-1," the viral strain isolated in Czechoslovakia, protected test animals as well as a passaged strain [214].

Examination of rabies vectors covered rodents,

including bats, and emphasized canines. Stray dogs are the principal vector in civilized areas. Wild foxes are considered the principal reservoir of the disease, spreading it to dogs. A survey has shown that pigs and birds also carry the disease [157]. Strains of rabies virus isolated from wolves and dogs are the most virulent and the least virulent strains come from humans, simians, and livestock [157]. Immunofluorescence and the FAM are used to determine specific antigens for differential diagnosis of rabies. These methods are both faster and more accurate than diagnosis by clinical symptoms, histology, and bioassay [218]. The FAM permits visual localization of antigen and cytoplasmic inclusion formation in living cells [196], and when the dye is bound to hyperimmune donkey serum, it is the most useful method for differential diagnosis of rabies [120, 192, 221].

Since some of the most effective rabies vaccines are difficult to prepare and maintain and have dangerous side effects, both tissue cultures and various viral strains are being screened in the search for suitable replacements for antirabies gammaglobulin and brain-tissue vaccines. A study of rabies virus variants showed that after long passaging in tissue culture the original wild-type strain acquires a shorter incubation period before causing symptoms and requires a lower Dlm (intracerebral) for infection of rabbits, but is completely apathogenic in rabbits when administered subcutaneously [158]. Variants of standard strains have been obtained; some of them are more pathogenic than the wildtype, producing symptoms in 1--2 days but with no discernable Babes-Negri bodies, while others cause atypical clinical forms of the disease. Especially interesting are strains isolated from African dogs suffering from a rabies-like disease related to Arctic "polar madness" or "rage," strains from cattle suffering from a disease described as "plague," and miscellaneous atypical strains from human adults [158]. When several variants were tested on different animals' tissues it was shown that homologous immune sera were the most accurate for diagnostic purposes [192]. These results have prompted research into different virus strains and substrate tissues for vaccine preparation.

Since passage in a given animal brain-tissue culture increases the virulence of the virus for that particular species and lessens it for other species, and since route of administration alters the clinical course of the

disease [153], it is likely that a variety of tissue-culture vaccines will become standard for these reasons and because cost and production technology will be simplified.

A specific gammaglobulin obtained from vaccinated humans was slightly effective but was inferior to horse-serum globulin [76].

Rabies virus has been cultured successfully on chick-embryo fibroblasts and an effective vaccine has been prepared from this culture [197]. Allergic reactions are one of the principal disadvantages of rabies vaccines in current use and several papers were published between 1962 and 1965 on experimental vaccines with reduced allergenic and anaphylactic proerties [31, 160, 210, 239]. Partial proteolytic hydrolysis of crude globulins during production reduces production volumes with increased vaccine yield [160]. Vaccine prepared from newborn rat and rabbit brain causes fewer allergic reactions than vaccine prepared from adult rat brains [31, 256]. Donkeys have been suggested as a source of antirabies gamma globulin since immune serum can be obtained from them more rapidly, their serum causes fewer reactions in use, and the animals themselves are easier to maintain and manage than horses [192].

Challenge tests of various vaccines and vaccination schemes have been reported in the literature. Production of active-passive immunity in laboratory animals has been achieved by the administration of a combined dose of antirabies gamma-globulin and 0.5% vaccine. Interference was eliminated by doses of gammaglobulin 4 days before starting the vaccination program [163]. The injection of cortisone interfered with the immune reaction, allowing a marked increase in virus multiplication [212]. Other experiments gave similar results [162, 210, 211]. The injection of standardized Fermi (formol) vaccine with or without gammaglobulin produced a plasmacytic reation in test animals, intensified RNA synthesis, and increased antibody titer in the resistant animals [211]. There was a direct relationship between the serum antibody titer and degree of resistance in the animal which, in turn depended on the potency of the vaccine [162, 210, 211].

At a conference on the effectiveness and safety of nonallergenic rabies vaccines held on the 18th and 19th of March 1965 at the Ivanovskiy Institute of Virology of the Soviet Academy of Medical Sciences and sponsored by a com-

mission of the Ministry of Public Health, all participants agreed that nonallergenic vaccines should replace the standard Fermi vaccine [210]. This special commission was established in 1962 especially to investigate the properties of new preparations and to engage in large-scale tests of them. Both wet and dried vaccines were tested by various laboratories and agencies. Members of the commission were: R. M. Shen, Institute of Virology; O. G. Andzhaparidze, head of the State Control Institute for Medical and Biological Preparations, Ministry of Public Health; S. S. Unanov, director of the Moscow Viral Preparations Research Institute; M. A. Selimov, head of the Rabies Laboratory at the Institute of Poliomyelitis and Viral Infections, AMN SSSR; M. A. Khiyenenson, Moscow Municipal Sanitary-Epidemiological Station; A. S. Makaryan, senior inspector of the Ministry of Public Health RSFSR; A. A. Mtvarelidze, Tbilisi Sanitary-Epidemiological Station, and B. A. Kantorovich, senior scientist of the Institute of Virology. V. M. Zhdanov, director of the Institute of Virology, was in charge of the organization of the work [210]. The commission began its work in January 1963, and made the following recommendations to the Ministry of Public Health SSSR in 1965: 1) immediate introduction of the nonallergenic vaccines into medical practice; 2) broader use of the dry nonallergenic vaccine; 3) the establishment of a similar commission to carry out more detailed studies of such vaccination programs [210].

IV. SWINE PLAGUE

Swine plague causes extensive damage to the circulatory system as shown by extensive septicemia in infected animals. Secondary infections such as paratyphoid, bacterial hemorrhagic septicemia, diplococcal infections, and listeriosis are the principal dangers of this disease. Differential diagnosis is complicated by the lack of really reliable laboratory tests. Likhachev states in Virus Diseases of Animals that the only definite means of differential diagnosis are analysis of clinical data, results of bacteriological studies, the epidemiological characteristics of the local outbreak, and the final isolation of the agent and production of the disease in animals [118]. Most vaccines are derived from infected tissue cultures and are concentrated by treatment with freon and subsequent precipitation in acetone [34]. Virus passaged in tissue cultures (usually swine embryo) differs in virulence from the original virus. Several passaged strains retained their virulence but were not immunogenic. However, these strains were used to produce hyperimmune sera and subsequently to inoculate other tissue cultures from which an avirulent dry vaccine was prepared for administration by aerosol. This aerogenic vaccine required seven days to become effective and protected 100% of test animals for two months [33, 152, 153, 251].

V. VENEZUELAN EQUINE ENCEPHALOMYELITIS

A fluorescent antibody test and a specific hemagglutination test based on recent discoveries have been suggested as possible diagnostic methods for Venezueland equine encephalomyelitis (VEE). In an investigation of virus reproductive dynamics in 1965, Gaydamovich and Vagzhanova discovered that a positive hemagglutination reaction can be obtained in tissue culture during the beginning of the logarithmic growth phase (6--7 hours after infection), and that there is a "threshold of infectivity" below which a positive hemadsorption reaction is not obtainable. They suggested that the hemagglutinating properties of the culture fluid would be useful for the early diagnosis of the disease and for studies of viral growth dynamics [279].

A diagnostic test for VEE based on the early appearance of VEE virus hemagglutinin in tissue cultures was devised by Gaydamovich and Vagzhanova. A comparison of results showed that neutralization indices were higher with tissue cultures than with convalescent sera and that the indices were 10,000 times lower when the cytopathic effect in mice was determined than when neutralization was performed with immune rabbit sera. Results could be obtained within 18 hours, and the method was recommended for early diagnosis of the disease [69]. The fluorescent antibody method (FAM) is also used in the study of viral reproduction and it has been modified for diagnostic use. Actinomycin D selectively halts cellular, but not viral, biosynthesis [280]; the acceleration of viral reproduction in tissue treated with the antibiotic has been reported [291]. Once cellular DNA synthesis has ceased, the FAM is employed to determine the synthesis site of VEE virus. RNA precursors and viral antigen can be detected visually in the cytoplasm by this method [280]. In the second method, when viral reproduction in tissue culture is accelerated by actinomycin-D, hemmagglutination tests can be used earlier than when the suspected culture is untreated [291].

Chemical inhibition of viral attachment to the cell membrane is reported by N. V. Kaverin. In his study, mouse fibroblasts and human liver cells in culture were treated with uranyl acetate which inhibited phosphate-group activity of the cell membrane. VEE virus attached to the cells but was easily removable, suggesting that phosphate groups are necessary for the firm binding of VEE virus to cell surfaces [100].

VI. MISCELLANEOUS DISEASES OF LIVESTOCK AND HUMANS

Insects and contaiminated food and water are the principal sources of vesicular stomatitis, a disease which infects cattle, swine, and humans (the latter under laboratory conditions). Some of the principal mechanical vectors are: *Stomoxys nigrirunis, Tabrus spp., Chrysops spp.*, and miscellaneous flying insects. Complement-fixation reactions are commonly used for differential diagnosis. Surviving animals are immune for one year after recovery. No specific therapy was reported in the literature studied and the most common treatment is symptomatic [132].

In the Soviet Union, infectious equine encephalomyelitis is spread by ticks, flies, and mosquitos. The mortality rate is often 100% and Babes-Negri bodies are frequently seen in brain tissue of dead animals. Several papers have been published investigating its connection with rabies [206]. The two most common diagnostic methods are bioassay and serodiagnosis (complement-fixation). Although therapeutic use of immune serum has been successful, the resultant protection is only transitory; this method has been replaced by vaccination with a chick-embryo vaccine (used on at least 45,000 horses as of 1963) or by an attenuated live vaccine obtained from rabbit brain [206].

Infectious equine anemia is spread in a variety of ways, generally from infected to uninfected horses via contaminated food or by *Diptera*. Transmission by intestinal parasites is also suspected. After recovery, an animal can carry the infection up to 6 years. Differential diagnosis is difficult since there are several diseases with similar symptoms, and chemical diagnostic methods are often unreliable. Diagnosis is mainly based on observation of symptoms and on the fact that outbreaks usually occur in late summer--early fall. Formol and aluminum hudroxide vaccines are often unsatisfactory; quarantine is thus the only really effective preventive measure [191].

Japanese infectious equine encephalomyelitis, a disease usually called "Japanese-B" encephalitis when observed in humans, also displays seasonality. It is most common near swampy areas during the summer, when it is spread by infected horses. Transovarial transmission has been demonstrated in the following ticks which are the principal vectors during the winter months: *Dermacentor pictus, D. nuttalli, Ixodes persulcatus, Rhip. cephalus turanicus, R. bursa, Rhipicephalus sanguineus, Hyalomma asiaticum.*

H. hemeriae, *H. marginatum* [208]. Complement-fixation with specific antigen is the most common diagnostic method. Recovery confers immunity in animals. Administration of formol vaccine (in three shots) each year before the start of the epidemic season, is effective as a vaccination program, although insect eradication is considered to be the most effective control measure [208].

Contagious pustulant dermatitis of sheep and goats (contagious ecthyma) has been reported in humans, including volunteers for experimental infection and individuals infected by a diseased animal. The disease affects mainly young sheep and goats, is spread by contaminated food and water, and has an incubation period of 8--10 days. It may be diagnosed by clinical observation, by the agglutination, precipitation, and complement-fixation reactions, by neutralization, and by bioassay. A dried vaccine, administered in saline, has been developed which protects against experimental and natural infections. Sheep are immune following recovery from natural infection. In the limited studies involving humans, little or no immunity existed after recovery and the vaccine gave limited protection [234].

Cattle are most susceptible to Rift Valley fever and are infected by insects which carry the virus from its rodent reservoirs to its principal hosts. Humans usually acquire the infection from infected cattle,and the mosquitoes *Aedes caballus* and *Culex theileri*. Other vectors are the fly *Eretmapoidites chrysogaster* and the *Rhipecephalus spp.* tick [231]. Standard serological reactions are used diagnostically and several experimental live-virus vaccines have been tested [231].

Livestock, particularly cattle and their wild relatives, are the most susceptible to rinderpest. The domestic animals acquire it from contact with wild carriers which include rodents, wild birds, insects, and pigs, as well as dogs and cats. The suslik *Citellus mongolicus* is the principal reservoir and carrier [21]. There are numerous papers reporting the results of studies on the serological relationships of this virus to various simian and swine-plague viruses. In the Soviet Union, complement-fixation employing specific hyperimmune serum or viral antigen preparations is used for early diagnosis. The diffuse precipitation-in-agar reaction is commonly used for differential diagnosis [21].

Most current research published deals with studies of various viral vaccines. A formol-aluminum hydroxide vaccine has been reported to be more effective than the tissue vaccines used previously, and a live-virus vaccine (attenuated) produces an immune response within 24 hours [21]. The use of ultrasound does not inactivate lapinized vaccines unless application is prolonged (60--120 min); small doses are useful in separating the lapinized virus from the tissue culture [167]. A dry vaccine prepared from stabilized Nakamura-III (L-III) strain proved as effective as the standard formol vaccine; however, its peak immunization titer required 20 days to appear [241].

VII. POX-VIRUS INFECTIONS AND THE DEVELOPMENT OF EFFECTIVE VACCINES

Pox viruses grown in tissue culture have been employed in vaccine reserch and in studies of the synthesis and intracellular localization of DNA. The reactivation of heat-killed viruses of this group by closely related strains has been studied and the results of one such study are shown in Table 6.

Table VI from [33].

Reactivation between variola, vaccinia and ectromelia virus es

Inactivated virus	Reactivating virus	Control	Tested in rabbits (scarification)	Tested in chick embryos (chorio-allantois)	Tested in mice (intraplantarly)
Vaccinia (neuro-vaccinia)	Variola		NV	NV+VA	—
		Vaccinia, inactivated	0	0	—
		Vaccinia, active	NV	NV	—
		Variola, active	0	VA	
Vaccinia (neuro-vaccinia)	Alastrim		NV	NV+AL	—
		Vaccinia, inactivated	0	0	—
		Vaccinia, active	NV	NV	—
		Alastrim, active	0	AL	
Ectromelia	Alastrim		—	EC+AL	EC
		Ectromelia, inactivated	—	0	0
		Ectromelia, active	—	EC	EC
		Alastrim, active	—	AL	0
Alastrim	Ectromelia		—	AL+EC	—
		Alastrim, inactivated	—	0	
		Alastrim, active	—	AL	
		Ectromelia, active	—	EC	
Ectromelia	Vaccinia		—	EC+OV	EC
		Ectromelia, inactivated	—	0	0
		Ectromelia, active	—	EC	EC
		Vaccinia, active	—	NV	0
Vaccinia (neuro-vaccinia)	Ectromelia		NV	NV+EC	—
		Vaccinia, inactivated	0	0	—
		Vaccinia, active	NV	NV	—
		Ectromelia, active	0	EC	—

NV — lesions characteristic of vaccinia (neurovaccinia strain)
VA — lesions characteristic of variola
AL — lesions characteristic of alastrim
EC — lesions characteristic of ectromelia
0 — no lesions.

In this study [36], the authors demonstrated reactivation using vaccinia, variola, alastrim, and ectromelia viruses. Results published in later papers indicated that reactivation of a heat-killed virus depends on the integrity of its DNA and part of its protein component [37], and that the factor causing deproteination of viral neucleocapsids is coded in the cell genome rather than that of the virus and that effects of this factor are observable within 2--2 1/2 hours after infection [151]. Reacitvation does not occur in cell cultures lacking this factor. Autoradiography and the FAM (fluorescent antibody method) have been used extensively in the study of cell-virus interaction and for differential diagnosis [80, 149], and autoradiography has been employed in studies of early viral DNA and antigen synthesis [175]. The FAM detects specific viral antigens in tissue cultures within 6 hours and has been used to distinguish vaccinia, variola, alastrim, varicella, cowpox, *Herpes zoster*, and *Herpes simplex* viruses. The chief advantages of the FAM are its specificity and simplicity [80]. Using cytopathic effect in tissue culture as part of the diagnostic procedure was complicated in one case by lack of temperature control; the importance of controlled, optimum temperatures during culture incubation was stressed as cytopathic effects often were not observed at temperatures higher or lower than optimum [79]. Because of their sensitivity, standard tissue-culture methods were generally recommended for confirming diagnosis and for diagnosis of asymptomatic carriers [133]. The two variants of vaccinia virus most commonly used in the preparation of vaccines have been called "red" and "white" because of the pockmarks they produce on chick chorioallantoic membranes. Differentiation is therefore done visually and confirmed by the differing hemagglutination activity of the two variants [133].

Antiviral compounds such as 6- azauracil riboside and urethane delay mortality in mice infected with vaccinia virus intranasally and intracerebrally, but do not lower mortality rate [86].

Tissue cultures are used to evaluate the activity of strains being screened and the potency of viral preparations, and to select mutants for further screening [81]. The plaque-forming properties of vaccinia virus in chick tissue culture have rendered it useful for a rapid, accurate, and economical procedure for determining vaccine potency. The method employs test-tube cultures and gives easily interpreted results in 48 hours [81].

Clonal mutant vaccines have been prepared in tissue culture and these vaccines have successfully immunized test animals and children [227], although they possess atypical properties in comparison to the parent strains and the heterogeneous virus population from which they were isolated [135]. Heterogeneous vaccines displayed properties dependent upon the proerties of their most common component [135]. The interference of inactivated virus with the multiplication of live virus in tissue culture has been traced to an as-yet-unidentified factor located in or on the inactivated virus. One of the principal factors governing the effect of the inactivated virus on live virus multiplication is the time between the injection of each type [174].

The immune mechanism involves plasmacytic response. In a series of papers [136, 225, 226, 229] the authors demonstrate the important role of phagocytosis, the significance of the site of inoculation and the innoculum dose (intravenous and intranasal are the most effective routes and intranasal is most economical inoculation method), and the degree of antibody synthesis in immunologically competent cells of the lymphatic organs. Antibody titers are highest after intravenous inoculation. The duration of immunity depends on the degree of plasmacytic response over a period of time and not necessarily on the initial degree of response [225]. Data from an experiment performed in 1962 confirm the above conclusions. In this experiment, animals irradiated with sublethal doses of gammaradiation were immunized with a dry live-virus vaccine 6--10 days after irradiation. In most cases the radiation slowed the development but not the degree of immunity. These results differ from those obtained with killed vaccines and from those obtained in experiments in which previously immunized animals were exposed to ionizing radiation [56].

1. Ado, A. D., et al. Allergenic properties of intermediate antigens of a brain vaccine against tickborne encephalitis. Voprosy virusologii, no. 5, 1965, 577-583.

2. Afanas'yeva, C. V., and Yu. F. Sapozhenkov. Data on the ixodid ticks (parasitformes, Ixodidae) infesting Tolai hares in the Turkmen SSR. IN: AN Turkmen SSR. Izvestiya, Seriya biologicheskikh nauk, no. 4, 1965, 91-92.

3. Albrecht, P., et al. Pseudorabies virus in chick-embryo cell cultures and in infected animals demonstrated by the fluorescent-antibody technique. Acta virologica, v. 7, no. 4, July 1963, 289-296.

4. Aleksandrov, N. I., et al. Aerosol immunization using dry, powdered vaccines and toxoids. Report 10. Clinical studies of postvaccinal reactions to immunization with a dry brucellosis vaccine. Zhurnal mikrobiologii, epidemiologii i immunobiologii, v. 33, no. 11, 1962, 31-37.

5. Aleksandrov, N. I., et al. Aerosol immunization using dry, powdered vaccines and toxoids. Report 8. Aerogenic immunization of large numbers of people with a dry plague vaccine. Zhurnal mikrobiologii, epidemiologii i immunobiologii, v. 33, no. 7, 1962, 46-50.

6. Aleksandrov, N. I., et al. Aerosol immunization with dry powdered vaccines and toxoids. Report 9. Reactive and immunological effectiveness of the aerogenic method of brucellosis vaccination. Zhurnal mikrobiologii, epidemiologii i immunobiologii, v. 33. no. 12, 1962, 95-102.

7. Aleksandrov, N. I., et al. Experience in mass aerosol immunization of man with powdered tularemia vaccine. Zhurnal microbiologii, epidemiologii i immunobiologii, no. 2, 1964, 38-43.

8. Altstein, A. D., et al. Interference between tickborne encephalitis and poliomyelitis viruses in tissue culture. I. Resistance of cells infected with t ckborne encephalitis to cytopathic effect of polio virus. Acta virologica, v. 6, no. 5, 1962, 421-427.

9. Altstein, A. D. Interference betwenn tickborne encephalitis and poliomyelitis viruses in tissue culture. II. Mechanism of cell resistance to poliovirus of tissue cultures infected with tickborne encephalitis virus. Acta virologica, v. 6, no. 6, 1962, 481-486.

10. Al'tshteyn, A. D. Titrating TBE virus and virus-neutralizing antibodies in human-embryo fibroblasts to investigate interference with polio virus. Voprosy virusologii, no. 5, 1962, 529-534.

11. Al'tshteyn, A. D., et al. A method for serological studies based on interference between TBE and polio virus in human tissue culture. Voprosy virusologii, no. 4, 1963, 392-397.

12. Ananyan, S. A. Preliminary serological and virological data on the isolation of arbo-A viruses in the eastern Soviet Union. Acta virologica, v. 8, no. 1, 1964, 93.

13. Andzhaparidze, O. G., and N. N. Bogomolova. Interaction of TBE virus and receptive cells *in vitro*. Report 4. Developmental phases of viruses in a monolayer cell culture. Voprosy virusologii, no. 1, 1962, 35-39.

14. Andzhaparidze, O. G., et al. Reaction of TBE virus with receptive cells *in vitro*. Report 5. Viral development in an infected cell and infective RNA. Voprosy virusologii, no. 4, 1962, 28.

15. Andzhaparidze, O. G., et al. Comparative sensitivity of various primary tissue culture lines (swine embryo) to destruction by TBE virus. Voprosy virusologii, no. 5, 1962, 534-536.

16. Andzhaparidze, O. G., et al. Chronic infection of cells with TBE virus. Report I. Properties of chronically infected cell cultures. Voprosy virusologii, no. 6, 1962, 650.

17. Andzhaparidze, O. G., et al. Variability of tickborne encephalitis virus. Report 1. Voprosy virusologii, no. 2, 1965, 165-167. JPRS 31,143

18. Anokhin, I. I. Spread of hemorrhagic nephroso-nephritis in Amur oblast. Zhurnal mikrobiologii, epidemiologii i immunobiologii, no. 4, 1965, 147. JPRS 33724

19. Avakyan, A. A., et al. Acute and chronic infections caused by TBE virus in tissue culture. Voprosy virusologii, no. 6, 1963, 713-719.

20. Barkova, E. A., and A. P. Ierusalimskiy. Dynamics of the appearance of virus-neutralizing antibodies in patients with various clinical forms of TBE. Voprosy virusologii, no. 2, 1963, 189-193.

21. Bazylev, P. M. Rinderpest. IN: Orlov, F. M., comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals). Moskva, Sel'khozizdat, 1963. 206-231.

22. Bazylev, P. M., and Yu. V. Fomin. Diagnosis of Aujeszky's disease by the diffusion precipitation in gel method. Veterinariya, no. 7, 1965, 16-19.

23. Benda, R., et al. Experimental airborne infection of monkeys with tickborne encephalitis. Acta virologica, v. 6, no. 1, 1962, 46-52.

24. Berulava, S. N. Using Ascangel to purify foot-and-mouth virus. IN: Voprosy veterinarno virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 203-208.

25. Berulava, S. I. Invasion and multiplication of foot-and-mouth disease virus in animal blood. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 214-219.

26. Bigovskiy, A. I. Viral characteristics of TBE in Western Ukraine. Voprosy virusologii, no. 6, 1964, 733.

27. Borisov, L. B. Comparative characteristics of the antiphage activity of dichlorethylamines. Mikrobiologiya, v. 33, no. 1, 1964, 79-84.

28. Borisov, L. B., and G. S. Yakovleva. Inhibitory effect of novoembichin on bacteriophages and viruses. Voprosy virusologii, no. 2, 1962, 148.

29. Borisov, L. B., and N. B. Rumel'. Antiviral activity of ethyleneimines. Voprosy virusologii, no. 6, 1963, 728.

30. Bratovanov, D., et al. Epidemiology of renal hemorrhagic fever in Bulgaria. Zhurnal mikrobiologii, epidemiologii i immunobiologii, v. 33, no. 1, 1962, 122-126.

31. Bukovskaya, S. N. Incidence of shock following administration of rabbit and sheep rabies vaccine. Zhurnal mikrobiologii, epidemiologii i immunobiologii, no. 6, 1965, 134-136.

32. Bukrinskaya, A. G. Luminescence microscopy study of the formation of incomplete Sendai virus in a tissue culture treated with proflavin. Voprosy virusologii, no. 2, 1962, 140-144.

33. Burtsev, V. I., et al. Experimental aerosol immunization against swine plague. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 269-273.

34. Bychkov, I. S. Purification and concentration of swine-plague virus. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 263-268.

35. Bychkova, Ye. N., and A. K. Shubadze. Shelf life of an experimental formalin-inactivated TBE tissue vaccine. Voprosy virusologii, no. 5, 1962, 624.

36. Chernos, V. I., and Ye. Z. Gendon. Reactivation between vaccinia, variola, and ectromelia viruses. Acta virologica, v. 7, no. 3, 1963, 282-285.

37. Chernos, V. I., and Y. Z. Gendon. Reactivation phenomenon of pox-group viruses. Voprosy virusologii, no. 2, 1964, 148-154.

38. Chervonskiy, V. I. Preparing immune sera to ornithosis for use in the complement-fixation reaction. Voprosy virusologii, no. 2, 1962, 248.

39. Chervonskiy, V. I. Immunobiological studies of ornithosis. Results of comparative serological studies of various animal species using the direct and indirect complement-fixation reactions with ornithosis-virus antigen. Voprosy virusologii, no. 2, 1964, 245.

40. Chumakov, M. P. Isolation of a virus differing from the agent of tickborne encephalitis from *Ixodes persulcators* ticks and humans in Western Siberia. Acta virologica, v. 7, no. 1. 1963, 82-83.

41. Chumakov, M. P. Isolation of a virus distinct from TBE virus from Siberian ticks. Voprosy virusologii, no. 1, 1963, 98-99.

42. Chumakov, M. P. Comparative epidemiological effectiveness of cultural and brain TBE vaccines. Voprosy virusologii, no. 3, 1963, 307-315.

43. Chumakov, M. P. Experimental production and control of a cultural TBE vaccine. Voprosy virusologii, no. 4, 1963, 415-420.

44. Chumakov, M. P., et al. Rate of antibody accumulation in humans after vaccination and revaccination against TBE. Voprosy virusologii, no. 5, 1964, 601-604.

45. Chumakov, M. P., et al. Conditions influencing the efficacy of tickborne encephalitis immunization. Voprosy virusologii, no. 2, 1965, 168-172. JPRS 31,143 6-14.

46. Chumakov, M. P. Effect of the interval between injections on the effectiveness of vaccination and revaccination against TBE. Voprosy virusologii, no. 3, 1965, 266-270.

47. Churilova, A. A., and V. N. Yagodinskiy. Results of using various tissue cultures for isolating TBE virus. Voprosy virusologii, no. 2, 1965, 242.

48. Danes, L. et al. Experimental tickborne infection of mice with tickborne encephalitis virus. Acta virologica, v. 6, no. 1, 1962, 37-45.

49. Desyatkova, R. G., et al. Basic properties and functions of TBE virus RNA. Voprosy virusologii, no. 1, 1963, 20-24.

50. Desyatkova, R. G., and O. G. Andzhaparidze. Plaques in tissue culture produced by TBE infectious RNA. Voprosy virusologii, no. 4, 1963, 398-399.

51. Desyatkova, R. G., and O. G. Andzhaparidze. Effect of some factors on plaque formation in cell cultures infected with TBE virus and its RNA. Voprosy virusologii, no. 3, 1964, 339-344.

52. Dubov, A. V. Tissue-culture methods for serological and virological diagnosis of tickborne encephalitis. Acta virologica, v. 6, no. 1, 1962, 58-65.

53. Dubov, A. V. Cytopathogenic action of TBE virus on human and animal tissue cultures. Voprosy virusologii, no. 1, 1962, 39-43.

54. Dzhekob, A., et al. Persistence of specific antibody and TBE virus absorbed on filter-paper discs. Voprosy virusologii, no. 4, 1964, 398-404.

55. Ernek, E., et al. Experimental infection of *Clethrionmys glareolus* and *Apodemus Glavicolus* with tickborne encephalitis virus. Acta virologica, v. 7, no. 5, 1963, 434-436.

56. Fedorov, Yu. B. Effect of ionizing radiation on poxvirus susceptibility. Voprosy virusologii, no. 1, 1962, 120-121.

57. Fedorov, Yu. B., and N. B. Plakhova. Obtaining anti-TBE sera and specific gammaglobulin for immunizing horses with a purified antigen. Voprosy virusologii, no. 2, 1962, 244.

58. Fedorov, Yu. B. Production of a dry, inactivated, brain TBE antigen for complement fixation. Voprosy virusologii, no. 6, 1962, 741.

59. Feoktistov, A. Z., and Z. N. Kondrashova. Study of the hemagglutinating capacity and the inhibition sensitivity of TBE virus strains from the Khabarovsk region. Voprosy virusologii, no. 6, 1964, 741.

60. Gagarina, A. V., et al. Nonencephalitogenic formolized vaccine against TBE. Voprosy virusologii, no. 2, 1964, 167-169.

61. Gaydamovich, S. Ya. Susceptibility of primary adult sheep-kidney cells to Japanese encephalitis virus. Voprosy virusologii, no. 2, 1962, 199-201.

62. Gaydamovich, S. Ya., and N. G. Titova. Accumulation dynamics of infectious virus particles and hemagglutinating and complement-fixing antigens of tickborne encephalitis virus in an infected tissue culture. Acta virologica, v. 6, no. 2, 1962, 151-158.

63. Gaydamovich, S. Ya., and Yu. M. Tsirkin. Improved laboratory diagnosis of tickborne spring-summer encephalitis. Report I. Hemagglutination and complement-fixation typing of viruses with tissue culture antigens. Acta virologica, v. 8, no. 3, 1964, 243-248.

64. Gaydamovich, S. Ya., et al. Isolation and identification of TBE virus in tissue culture. Voprosy virusologii, no. 3, 1964, 344-348.

65. Gaydamovich, S. Ya., et al. Tickborne and Japanese-B encephalitis virus complement-fixing antigens from tissue culture. Acta virologica, v. 6, no. 3, 1962, 231-238.

66. Gaydamovich, S. Ya., and V. V. Vlodavets. Observation of the minimal concentration of influenza virus in the vapor phase of an aerosol. Voprosy virusologii, no. 3, 1963, 349-353.

67. Gaydamovich, S. Ya., and V. A. Vagzhanova. Early detection of arboviruses in tissue culture by hemagglutination. Voprosy virusologii, no. 6, 1964, 712-714.

68. Gaydamovich, S. Ya., and Duan Suan Myou. An HI diagnosticum for Japanese encephalitis virus. Voprosy virusologii, no. 1, 1965, 105-110.

69. Gaydamovich, S. Ya., and V. A. Vagzhanova. Virus-neutalization reaction for VEE based on hemagglutination. Voprosy virusologii, no. 3, 1965, 271-275.

70. Gendon, Yu. Z. The ability of certain viruses to block the effect of interferon. Acta virologica, no. 2, 1965, 186-187.

71. Gendon, Yu. Z., et al. A dry tissue culture hoof-and-mouth vaccine. Voprosy virusologii, no. 1, 1963, 114-115.

72. Gendon, Yu. Z., et al. Properties of genetically homogeneous vaccinia clones. Voprosy virusologii, no. 3, 1964, 291-295.

73. Germanova, K. I., et al. Viricidal properties of the antibiotic 1936/I. Antibiotiki, no. 10, 1964, 914-919.

74. Gil'manova, G. Kh., et al. Infection with TBE virus through cow's milk. Voprosy virusologii, no. 1, 1964, 47-49.

75. Gnuni, G. M., and I. G. Malygina. Technical and production problems connected with the mass production of cultural vaccines. Voprosy virusologii, no. 5, 1965, 614-618.

76. Gorshunova, L. P. Specific antirabies gamma-globulin obtained from the serum of humans vaccinated against rabies. Voprosy virusologii, no. 5, 1963, 626-627.

77. Grigor'yeva, L. V. Inactivation of a phage aerosol by electroprecipitation, bubbling through a liquid, and by a sodium alginat powder. Voprosy virusologii, no. 1, 1963, 87.

78. Grinets, I. G. Morphological and functional changes in blood cells and cerebellum of chick embryos infected with foot-and-mouth disease virus. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 155-165.

79. Gurvich, E. B. Influence of various temperatures on pox viruses in tissue culture. Voprosy virusologii, no. 1, 1964, 116-118.

80. Gurvich, E. V., and V. M. Ro'yel. Use of the fluorescent antibody technique in the detection and differential diagnosis of small pox. Acta virologica, no. 9, 1965, 115-117.

81. Gurvich, E. B., and V. N. Milyushin. Utilizing the plague-forming ability of vaccinia virus to determine smallpox-vaccine activity. Voprosy virusologii, no. 6, 1965, 734-738.

82. Han Shi-gie, and V. V. Pogodina. Fluorescent-antibody technique in the study of Far-Eastern tickborne encephalitis in mice, hamsters, and pigs. Acta virologica, v. 8, no. 1, 1964, 22-29.

83. Ilyenko, V. I. Preparation of a vaccine against tick-borne encephalitis from brains of newborn mice and rats. Acta virologica, v. 6, no. 2, 1962, 187.

84. Il'yenko, V. I., and G. P. Zhilova. Preparation method and immunogenic properties of a killed tissue culture vaccine against tickborne encephalitis. Acta virologica, v. 7, no. 1, 1963, 54-60.

85. Isakova, T. T. Gamasidic tick fauna of Transbaikal Birds. Report II. IN: Chitinskiy gosudarstvennyy pedagogicheskiy institut. Uchenyye zapiski, (TAKEN FROM: Referativnyy zhurnal, Biologiya, no. 10, 1964, Abs. 10K108)

86. Jasinska, H., et al. Effects of antiviral substances on experimental virus infections. III. Effects of 6-azauracil riboside and usethane on vaccinia virus infection in mice infected intranasally. Acta virologica v. 6, no. 1, 1962, 17-23.

87. Kalmykova, A. D., et al. Hemolysis reaction in Omsk fever. Voprosy virusologii, no. 6, 1962, 729.

88. Kalmykova, A. D. Role of certain rodent species in the epidemiology of epidemic renal hemorrhagic fever and means of rodent control. IN: Khabarouskiy nauchvo-issledovatel'skiy institut epidemiologii i mikro-biologii. Uchenyge zopiski, no. 7, 1962, 32-34. JPRS 31152,119

89. Kautcrovich, R. A., et al. Experimental study of rage (polar madness) and rabies in polar foxes, natural hosts of the infection. I. Experimental morphological study of rage in polar boxes. Acta virologica, v. 7, no. 6, 1963, 554-560.

90. Kantorovich, R. A., and A. G. Markaryan. Pathogenicity of the rage (polar rabies) virus for humans. Voprosy virusologii, no. 6, 1963, 747.

91. Kantorovich, R. A., et al. Test of comparative epidemiological-serological study of differing types of TBE foci. Voprosy virusologii, no. 6, 1964, 734.

92. Karaseva, P. S., and I. F. Semenov. Comparative evaluation of the suitability of various tissues for demonstrating the minimal dose of TBE virus. Voprosy virusologii, no. 4, 1962, 35-39.

93. Karaseva, P. S., et al. Color test for TBE. Voprosy virusologii, no. 1, 1964, 119-120.

94. Karmysheva, V. Ya., et al. Effect of Omsk-fever virus on a sensitive tissue culture. Voprosy virusologii, no. 5, 1965, 557-563.

95. Karpov, S. P., and A. A. Selezneva. HI reaction for TBE. Voprosy virusologii, no. 6, 1962, 740-741.

96. Karpovich, L. G., and V. K. Izotov. Hemagglutinating properties of the tickborne encephalitis complex propagated in various cell cultures. Acta virologica, v. 8, no. 4, 1964, 376-377.

97. Karpovich, L. G., and G. I. Sergeyeva. Isolation and identification of TBE virus by a tissue-culture method. Voprosy virusologii, no. 3, 1965, 371.

98. Kasova, V. Course of tickborne encephalitis virus infection in cortisone-treated white mice. Acta virologica, v. 6, no. 2, 1962, 186.

99. Kosova, V. Effect of urethane-barbital anesthesia on the course of tickborne encephalitis infection in white mice. Acta virologica, v. 6, no. 3, 1962, 271-274.

100. Kaverin, N. V. First stages of viral activity in the sensitive cell. Communication III. Significance of cell-membrane phosphate groups in the attachment of the virus to the cell wall. Voprosy virusologii, no. 1, 1965, 14-16.

101. Ketiladze, Ye., et al. Use of fluorescent-antibody method for rapid differential diagnosis of influenza, parainfluenza, and adenoviral illnesses. Voprosy virusologii, no. 3, 1964, 348-353.

102. Klenina, N. V., et al. Obtaining purified foot-and-mouth virus preparations from various animal tissues using chloroform. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 196-202.

103. Kondrashova, Z. N. Comparative studies of serological methods of detecting antibodies against tickborne encephalitis virus in tick host. Report I. Comparative serology of TBE virus detection in white mice. IN: Khabarovskiy nauchno-issledovatel'skiy institut epidemologii i mikrobiologii. Uchenyye zapiski, no. 7, 1962, 7-11.

104. Konovalov, G. V. A comparative morphologic study of the cytopathological effect of related viruses of street rabies and dikovaniye. IN: AN SSSR. Doklady, v. 157, no. 2, 1964, 451-453.

105. Konovalov, G. V., et al. Experimental study of rage and rabies in polar foxes, natural hosts of the infections. Report 2. Experimental morphological study of rabies in polar foxes. Voprosy virusologii, no. 6, 1964, 736.

106. Konovalov, G. V., et al. Rage and rabies in polar foxes, natural hosts of the infection. II. Experimental morphological study of rabies in polar foxes. Acta virologica, no. 9, 1965, 235-239.

107. Kozuch, O., et al. Persistance of tickborne encephalitis virus in hibernating hedgehogs and dormice. Acta virologica, v. 7, no. 5, 1963, 430-433.

108. Kozuch, O., and J. Nosek. Alimentary infection of the hedgehog with tickborne encephalitis (TBE) virus. Acta virologica, v. 8, no. 3, 1964, 284.

109. Krasovskiy, F. V., and Yu. M. Tsirkin. Isolation from ixodid ticks in Krasnoyarskiy kray of a cytopathogenic virus differing from the pathogenic agent of tickborne encephalitis. IN: Kleshchevoy entsefalit i virusnyye gemorragicheskiye likhoradki; sbornik (Tickborne encephalitis and viral hemorrhagic fevers; collection of articles). Omsk, 1963. 81-82. (TAKEN FROM: Referativnyy zhurnal. Biologiya, no. 16, 1964, Abs.16K95)

110. Kulakova, Z. G. The fauna, ecology, and epizootiological significance of fleas in foci of tickborne encephalitis. IN: Kleshchevoy entsefalit i virusnyye gemorragicheckiye likhoradki; sbornik (Tickborne encephalitis and viral hemorrhagic fevers; collection of articles). Omsk, 1963. 189-191. (TAKEN FROM: Referativnyy zhurnal. Biologiya, no. 18, 1964. Abs. 18K147)

111. Kurbanov, I. A. Virus-vector possibilities in the case of parrot ornithosis. Veterinariya, no. 11, 1965, 45-46. JPRS 34186

112. Kvashnina, A. S., and O. N. Komarova. A Sverdlovsk focus of spring-summer tickborne encephalitis. Voprosy virusologii, no. 4, 1965, 495.

113. Lakhanov, Zh. L. Biology of some diurnal carnivorous birds in southeastern Kyzylkum. Uzbekhskiy biologicheskiy zhurnal, v. 9, no. 5, 1965, 64-67. JPRS 34186

114. Lapin, B. A. Reproduction of human diseases in animals. IN: Akademiya meditsinskikh nauk SSSR. Vestnik, no. 11, 1965, 3-12.

115. Levkovich, Ye. N., and G. D. Zasukhina. Studies on cultural TBL vaccines. Voprosy virusologii, no. 1, 1963, 56.

116. Likhachev, N. V., et al. Improvement of a method for mincing virus-containing tissues. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 88-91.

117. Likhachev, N. S., et al. Experimental foot-and-mouth vaccine and results of its applied use. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 220-226.

118. Likhachev, N. V. Swine plague. IN: Orlov, F. M., comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals). Moskva, Sel'khozizdat. 1963, 470-497.

119. Lipin, S. I. Birds as hosts of the wood tick *Ixodes persulcatus* P. Sch. in the Sayan region. IN: Irkutskiy nauchno-issledovatel'skiy institut epidemiologii i mikrobiologii. Trudy, no. 7, 1962, 109-120. (TAKEN FROM: Referativnyy zhurnal. Biologiya, no. 6, 1964, Abs. 6K83)

120. Lipkin, M. Ye., et al. Use of the fluorescence method for revealing poliomyelitis and rabies virus. Voprosy virusologii, no. 1, 1965, 26-29.

121. Loginova-Parina, N. V. Technique of plaque formation by TBE viruses and some of its possible uses. Voprosy virusologii, no. 1, 1964, 25-29.

122. Loginova-Parina, N. V., and Ye. N. Levkovich. Comparative characterization of plague formation by TBE viruses. Voprosy virusologii, no. 4, 1964, 404-408.

123. Lopatin, A. N., et al. Cases of relapsing TBE. Voprosy virusologii, no. 6, 1962, 741.

124. Lukhashev, I. I. Prophylactic therapeutic effect of gammaglobulin used in treating Aujesky's disease. Vestnik sel'skokhozyaystvennoy nauki, no. 7, 1965, 104-106. JPRS 33724, 288-289

125. Lukina, R. N., and V. D. Neustroyev. Effect of residual moisture on shelf life of dried TBE and Japanese encephalitis preparations. Voprosy virusologii, no. 4, 1962, 116-117.

126. L'vov, D. K., and V. A. Zaklinskaya. Use of the HI reaction to evaluate the immunogenic properties of formolized TBE vaccines. Voprosy virusologii, no. 3, 1963, 360-361.

127. L'vov, D. K., et al. Antihemagglutinating antibody spectrum following experimental immunization with tickborne encephalitis viruses. Voprosy virusologii, no. 6, 1965, 657-663.

128. Lvova, A. I. Fluorescent-antibody method used in tickborne encephalitis virus isolation experiments from patients. Acta virologica, v. 6, no. 4, 1962, 283.

129. L'vova, A. I., and N. G. Titova. Using various virological methods to determine cellular and free antigen to TBE virus in tissue culture during a study of the dynamics of infection. Voprosy virusologii, no. 6, 1962, 665-670.

130. Malkova, D. Effect of x-irradiation on the spread of tickborne encephalitis virus through the regional lymphatic system. Acta virologica. v. 6, no. 5, 1962, 475-476.

131. Malkova, D., and Z. Marhoul. Neutralization test with tickborne encephalitis virus in pig-kidney cells. Acta virologica, v. 6, no. 4, 1962, 374.

132. Malkova, D., and J. M. Kolman. Role of the regional lymphatic system of the immunized mouse in the penetration of tickborne encephalitis virus into the blood stream. Acta virologica, v. 8, no. 1, 1964, 10-13.

133. Marennikova, S. S., et al. Laboratory diagnosis of smallpox and similar viral diseases by tissue-culture methods. Report I. Sensitivity of tissue-culture methods in the detection of variola virus. Acta virologica, v. 7, no. 2, 1963, 124-129.

134. Marennikova, S. S., and N. N. Mal'tseva. Comparative study of some vaccinia viruses. Communication 1. Behavior in embryonated eggs. Hemagglutinating activity and thermoresistance. Voprosy virusologii, no. 3, 1964, 280-286.

135. Marennikova, S. S., and N. N. Mal'tseva. Selection and properties of clonal mutants of vaccinia virus. Voprosy virusologii, no. 2, 1965, 142-149.

136. Mastyukova, Yu. N., and A. A. Sumarokov. Mechanism of smallpox immunity. Communication 3. Role of leukocytes in smallpox immunity. Experiments in vitro. Voprosy virusologii, no. 2, 1964, 137-142.

137. Mayer, V., and J. Zemla. Multiplication of tickborne encephalitis virus in suspended HeLa cell cultures. Acta virologica, v. 6, no. 1, 1962, 53-57.

138. Mayer, V., "Partial" cytcpathic effect of tickborne encephalitis virus - a consequence of persistant infection of stable cell lines. Acta virologica, v. 6, no. 1, 1962, 92.

139. Mayer, V. Interactions of mammalian cells and tickborne encephalitis virus. I. Propagation rate and cytopathic effect of tickborne encephalitis virus in selected cells and maintenance media. Acta virologica, v. 6, no. 5, 1962, 239-252.

140. Mayer, V. Study of tickborne encephalitis virus by the plaque-assay method in chick-embryo tissue. Acta virologica, v. 6, no. 4, 1962, 309-316.

141. Mayer, V. Interaction of mammalian cells with tickborne encephalitis virus. II. Persisting infection of cells. Acta virologica, v. 6, no. 4, 1962, 317-326.

142. Mayer, V. Virulence of tickborne encephalitis virus. I. Experimentally obtained line of tickborne encephalitis virus with changed pathogenicity for young mice. Acta virologica, v. 7, no. 5, 1963, 421-430.

143. Mayer, V. Virulence of tickborne encephalitis virus. II. Pathogenic properties of two variants of a single virus strain. Acta virologica, v. 8, no. 1, 1964, 14-21.

144. Mayorova, G. F., et al. Diagnostic value of lytic reaction in chicken erythrocytes in Omsk fever. Voprosy virusologii, no. 5, 1964, 614-617.

145. Mekler, L. B., et al. Simple method for the analysis of fluorescein-protein conjugates. Voprosy virusologii, no. 5, 1964, 631-634.

146. Kekler, L. B., and V. K. Naumova. Obtaining fluorescent gammaglobulins suitable for differential diagnosis of viral infections. Voprosy virusologii, no. 2, 1965, 235-240.

147 Mekler, L. B. Genetic information used for synthesis of virus components and antiviral immunity. Voprosy virusologii, no. 4, 1965, 499-504.

148. Mel'nik, R. I. Use of a tissue-culture foot-and-mouth disease virus in vaccines and diagnostic preparations. Communication one. Growing the virus in cattle epithelium. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 104-119.

149. Mel'nikova, L. A., and I. A. Kozlova. Interaction between pox virus and a susceptible cell. Voprosy virusologii, no. 3, 1964, 362-364.

150. Mel'nikova, Ye. E., and Yu. M. Tsirkin. Use of tissue-culture antigen for complement-fixation analysis of sera from TBE patients. Voprosy virusologii, no. 2, 1964, 158-162.

151. Mel'nikova, L. A., et al. Source of factors causing the deproteination of vaccinia-virus nucleocapsids. Voprosy virusologii, no. 4, 1965, 447-453.

152. Mikhaylov, S. K. Use of a cultural swineplague vaccine for preparing vaccines and hyperimmune sera. Communication I. Adaptation of various viral Strains. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 233-242.

153. Mikhaylov, S. K. Immunogenic properties of swineplague virus grown in tissue culture. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 247-252.

154. Minayeva, V. M. Cytopathic effect of TBE virus in various types of cells. Voprosy virusologii, no. 5, 1962, 623.

155. Mitin, N. I., et al. Complement fixating and blood effects of vaccinated animals. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology. Moskva, Kolos, 1964. 319-326.

156. Naumova, V. K., et al. A method for rapid diagnosis of respiratory virus infections. Voprosy virusologii, no. 4, 1964, 502-505.

157. Nazarov, V. P. Rabies. IN: Orlov, F. M., comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals) Moskva, Sel'khozizdat, 1963. 138-152.

158. Nazarov, V. P. Variation in rabies virus. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 507-514.

159. Neustroyev, V. D. and V. N. Pautov. Experimental data on the adaptation of Japanese encephalitis virus to guinea pigs. Voprosy virusologii, no. 5, 1962, 622.

160. Nikitenko, A. A., and G. D. Kobrinskiy. Obtaining an active fraction possessing reduced anaphylactic activity from antirabies hyperimmune serum. Voprosy virusologii, no. 3, 1964, 315-320.

161. Nikitin, Ye. Ye., et al. Resistance of foot-and-mouth virus and influenza virus to drying by a spray method. Voprosy virusologii, no. 6, 1962, 719-723.

162. Nogioheva, M. A. Effectiveness of different means of using antirabies gamma globulins and vaccines. Voprosy virusologii, no. 6, 1964, 737.

163. Nogicheva, M. A. Development of an optimal plan for combined passive-active immunization against rabies. Zhurnal mikrobiclogii, epidemiologii i immunobiologii, no. 3, 1965, 144-145.

164. Nosek, J. Experimental infection of the great dormouse *Glis glis* with tickborne encephalitis virus. Acta virologica, v. 7, no. 4, 1963, 374-376.

165. Obukhova, V. R., and S. Ya. Gaydamovich. Cytopathic activity of various Japanese encephalitis virus strains in sheep-embryo kidney epithelium culture. Voprosy virusologii, no. 2, 1962, 201-206.

166. Obukhova, B. R. Neutralization test technique for detecting antibodies against Japanese encephalitis in sheep-embryo kidney culture. Voprosy virusologii, no. 1, 1964, 39-42.

167. Okovytyy, A. S. Effect of ultrasound on lapinized rinderpest virus. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 75-79.

168. Oleynik, N. K., and A. I. Dudnikov. Use of diffusion-precipitation-in-agar reaction in diagnosing hoof-and-mouth disease. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 182-189.

169. Orlov, F. M. Vesicular stomatitis. IN: Orlov, F. M., comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals). Moskva, Sel'khozizdat, 1963. 115-124.

170. Parfanovich, M. I., and N. N. Sokolov. Fluorescence microscopy of the reaction of antigens and nucleic acids in tissue cultures infected with measles and TBE viruses. Acta virologica, no. 4, 1965, 352-357.

171. Pchelkina, A. A., and E. I. Korenburg. Results of indirect hemagglutination for revealing contacts of birds with tickborne encephalitis. Voprosy virusologii, no. 2, 1965, 243.

172. Perelatov, V. D. Hemorrhagic fever in the Rostov region. Zhurnal mikrobiologii, epidemiologii i immunobiologii, no. 12, 1964, 117-118.

173. Pershin, G. N., et al. Antibacterial and antiviral action of several lactams and lactones. Zhurnal microbiologii, epidemiologii i immunobiologii, no. 3, 1964, 109-114. JPRS 24,225

174. Peterson, O. P., and Li Yuy. Homologous interference between active and inactive vaccinia virus in cultures. Voprosy virusologii, no. 2, 1963, 159-163.

175. Peterson, O. P., et al. Interaction of vaccinia virus with tissue-culture cells. Voprosy virusologii, no. 2, 1964, 154-158.

176. Petrov, Yu. I., et al. Resistance and reactivity of a dry hoof-and-mouth vaccine from strain L-III. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 306-319.

177. Pogodina, V. V., and A. P. Savinov. Variation in pathogenicity of TBE viruses for different animal species. I. Experimental infection of mice and hamsters. Acta virologica, v. 8, no. 5, 1964, 424-434.

178. Pogodina, V. V., et al. Variable pathogenicity of the TBE virus complex for different animal species II. Acta virologica, v. 8, no. 6, 1964, 521-531.

179. Pogodina, V. V., and Shi-tsze Khan'. Correlation between pathogenicity of TBE viruses for animals, and peculiarities of their growth in the body. Voprosy virusologii, no. 6, 1964, 682-690.

180. Pogodina, V. V., and Khan Shi-tsze. Correlation between growth in and pathogenicity for animals of tickborne encephalitis viruses. Communication 2. Voprosy virusologii, no. 1, 1965, 30-36.

181. Polenova, I. N., et al. Japanese encephalitis focus in the southern Primor'ye. Voprosy virusologii, no. 5, 1965, 625.

182. Popov, V. F. Use of specific gammaglobulins therapeutically in a TBE focus. Voprosy virusologii, no. 4, 1962, 53-55.

183. Popova, O. M., and O. N. Berezina. Effect of preliminary x-irradiation of the susceptibility of white mice to aerosol infection with ornithosis virus. Voprosy virusologii, no. 2, 1964, 213-216. JPRS 24,696

184. Pospelova-Strom, N. V, and R. L. Naumov. A case of transporting the tick *Haemaphysalis ornithophila* (Oxodoidea, Ixodidae) into the Soviet Union via a migratory bird, *Turdus dauma* Zodogicheskiy zhurnal, v. 44, no. 9, 1965, 1411-1412. JPRS 34186

185. Priymyagi, L. S. Effect of interferon on enteroviruses in an experiment. Voprosy virusologii, no. 6, 1965, 694-699.

186. Pshenichnov, A. V., et al. Epidemiology of TBE in the Urals. Voprosy virusologii, no. 6, 1962, 661-665.

187. Pshenichnov, A. V., et al. Epidemiology of TBE in the Urals. Voprosy virusologii, no. 6, 1962, 661-665.

188. Rehacek, J. Transovarial transmission of tickborne encephalitis virus by ticks. Acta virologica, v. 6, no. 3, 1962, 220-226.

189. Rehacek, J., and Kozuch, O. Comparison of the susceptibility of primary tick and chick-embryo cell cultures to small amounts of tickborne encephalitis virus. Acta virologica, v. 8, no. 5, 1964, 470-471.

190. Rodin, I. M., et al. Experimental serotherapy of Omsk fever. Voprosy virusologii, no. 2, 1963, 193-199.

191. Rodionov, N. M. Infectious equine anemia. IN: Orlov, F. M., comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals). Moskva, Sel'khozizdat, 1963. 377-411.

192. Roslyakov, A. A. Plan for obtaining highly active antirabies sera. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 497-506.

193. Rzhakhova, O. Ye., and M. P. Chumakov. Use of an agar precipitation reaction for antigenic differentiation of viruses of the tickborne encephalitis subgroup. Voprosy virusologii, no. 5, 1965, 589-594.

194. Salagova, T. A. A Method of obtaining type-immune serum against tickborne encephalitis. Laboratornoye delo, no. 7, 1965, 428-430.

195. Salazhov, Ye. L., et al. Virulent, immunogenic, and complement-fixating properties of foot-and-mouth virus. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 209-213.

196. Selimov, M. A., et al. Interference in tissue cultures induced by rabies virus. Acta virologica, no. 5, 1965, 445-448.

197. Selimov, M. A . L. I. Kalinina. Experimental tissue antirabies vaccine. Report 1. Culturing a strain of rabies virus on chick-embryo fibroblasts and using the tissue culture for vaccine. Voprosy virusologii, no. 3, 1965, 368.

198. Semenov, B. F. Cultural and inactivated viruses for a tissue TBE vaccine. Voprosy virusologii, no. 6, 1962, 654-657.

199. Semenov, B. F. Epidemiologic effectiveness of various TBE vaccines. Voprosy virusologii, no. 4, 1963, 436.

200. Semenov, B. F., and A. I. Rezepova. Method of preparing a noninfectious TBE antigen for the HI reaction under production conditions. Voprosy virusologii, no. 1, 1962. 55-59.

201. Semenov, B. F., and A. I. Rezenova. Large-scale serological survey method for identifying antibodies to TBE virus. Voprosy virusologii, no. 3, 1964, 367-368.

202. Semenov, B. F., et al. Postvaccinal and postinfection immunity in TBE. Voprosy virusologii, no. 5, 1964, 597-601.

203. Semenov, B. F. Conference on arbovirus infections. Voprosy virusologii, no. 2, 1965, 248-249.

204. Sergeyenko, A. D. Possibility of using the aldolase reaction in diagnosing Omsk fever. Voprosy virusologii, no. 2, 1962, 244-245.

205. Sergeyev, V. A., et al. Reproduction of viruses in immune tissues. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 80-87.

206. Sergeyev, V. A., et al. Effect of certain factors on the nultiplication of cells and viruses in swine-kidney tissue culture. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 119-129.

207. Shalunova, N. V., et al. Interference of Japanese encephalitis and other cytopathic viruses in tissue culture. Voprosy virusologii, no. 5, 1965, 551-557.

208. Shcherbatykh, P. Ya. Japanese infectious equine encephalomyelitis. IN: Orlov, F. M., comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals). Moskva, Sel'khozizdat, 1963. 175-181.

209. Shcherbatykh, P. Ya. Infectious equine encephalomyelitis in the Soviet Union. IN: Orlov, F. M., comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals). Moskva, Sel'khozizdat, 1963. 362-377.

210. Shen, R. M. Conference of the commission for studying the effectiveness and reactivity of nonallergenic antirabies vaccine. Voprosy virusologii, no. 4, 1965, 506-508.

211. Shukyer, A. A. Plasmacytic reactions from antirabies vaccine. Voprosy virusologii, no. 1, 1964, 72-77.

212. Shukeyr, A. A., and N. N. Nosik. Effect of cortisone on immune reactions in rabies. Acta virologica, no. 9, 1965, 472.

213. Skoda, R. Modified pseudorabies virus suitable for immunization of cattle. Acta virologica, v. 6, no. 2, 1962, 189.

214. Skoda, R., et al. Immunization against Aujeszkiy's disease with live raccine. I. Attenuation of virus and some properties of attenuated strains. Acta virologica, v. 8, no. 1, 1964, 1-9.

215. Skomorokhov, A. L. Hoof-and-mouth disease. IN: Orlov, F. M., comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals). Moskva, Sel'khozizdat, 1963. 77-115.

216. Smorodintsev, A. A., et al. Virusnyye gemorragicheskiye likhoradkhi (Virus hemorrhagic fevers). GIMIZ, 1963.

217. Smorodintsev, A. A., Basic nonspecific protective factors of warmblooded animals against viral infections. Voprosy virusologii, v. 9, no. 5, 1964, 587-596.

218. Sokolov, N. N., and K. A. Vanag. Nature of intracellular inclusions in experimental rabies. Acta virologica, v. 6, no. 5, 1962, 452-457.

219. Sokolov, N. N., et al. Tickborne encephalitis virus. I. Comparison of nucleic acids and specific antigens in sheep-embryo kidney-cell cultures infected with tickborne encephalitis using fluorescence microscopy. Acta virologica, v. 7, no. 3, 1963, 209-216.

220. Sokolov, N. N., et al. Tickborne encephalitis virus. II. Fluorescence microscopy of nucleic acids and specific antigens from brains of white mice infected with the virus. Acta virologica, v. 7, no. 3, 1963, 217-224.

221. Sokolov, N. N., and M. I. Parfanovich. Demonstration of antigen and specific nucleic acid of rabies virus in tissue culture using luminescence microscopy. Voprosy virusologii, no. 6, 1963, 740.

222. Sokolov, N. N., and M. I., Parfanovich. Accumulation of specific antigen and distribution of nucleic acid in sheep-embryo kidney cells infected with street rabies virus revealed by fluorescence microscopy. Acta virologica, no 2, 1965, 191.

223. Solomin, N. N., et al. Use of tissue cultures for studying hemagglutinating properties of TBE virus and the possibility of using a cultural antigen in the hemagglutination-inhibition reaction. Communication I. Voprosy virusologii, v. 1, no. 6, 1964, 739.

224. Solov'yev, Yu. K., and V. I. Trofimov. Study of the arthropod fauna associated with wild birds under the conditions of Gor'kovskaya Oblast, and their possible epidemiological significance. IN: Gor'kovskiy Universitet. Uchenyye zapiski, no. 62, 1964, 60-74. (TAKEN FROM: Referativnyy Zhurnal. Biologiya, no. 18, 1964, Abs. 18K81)

225. Solov'yev, V. D., et al. Mechanism of smallpox immunity. Communication 4. Antibody production during the development of specific immunity. Voprosy virusologii, no. 2, 1964, 143-148.

226. Solov'yev, V. D., and Yu. N. Mastyukova. Mechanism of smallpox immunity. Communication 5. Role of cell reactivity in specific-susceptibility phenomena. Voprosy virusologii, no. 3, 1964, 296-301.

227. Solov'yev, V. D. Some results of a study on antiviral immunity of tissue. Voprosy virusologii, no. 5, 1964. 580-587.

228. Solov'yev, V. D., et al. International symposium on nonspecific resistance to viral infections, interferon, and chemotherapy of viral infections. Voprosy virusologii, no. 4, 1965, 505.

229. Solov'yev, V. D., et al. Smallpox-immunity mechanism. Communication 6. Effect of antigens on specific nonreceptivity. Voprosy virusologii, no. 5, 1965, 583-589.

230. Somov, G. P., and G. M. Soldatov. Role of birds in the circulation of the tickborne typhus agent in nature. Zhurnal mikrobiologii, epidemiologii i immunobiologii, no. 1, 1964, 126-129.

231. Sosov, R. F. Rift-Valley fever. IN: Orlov, F. M., comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals). Moskva, Sel'khozizdat, 1963. 181-188.

232. Sotnikova, A. N. Immunological structure of a mammal and bird population in a Primor'ye TBE focus. Voprosy virusologii, no. 4, 1963, 515.

233. Spotarenko, S. S. The significance of relative indices in studying the seasonal character of infectious diseases. Zhurnal mikrobiologii, epidemiologii i immunobiologii, no. 6, 1964, 22-25.

234. Strogov, A. K. Contagious pustulent dermatitis (contagious ecthyma) of sheep and goats. IN: Orlov, F. M., comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals). Moskva, Sel'khozizdat, 1963. 125-138.

235. Strogov, A. K. "Rage" of arctic animals. IN: Orlov, F. M., comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals). Moskva, Sel'khozizdat, 1963. 188-206.

236. Strogov, A. K. Certain problems of studying polar madness (rage) in the arctic tundra of Yakutiya. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 515-532.

237. Suan-Myou, Duan. Production of noninfectious hemagglutinins of Japanese encephalitis virus. Voprosy virusologii, no. 1, 1964, 35-38.

238. Sushkov F. V., et al. Morphological and cytochemical characteristics of pig-kidney cells infected with foot-and-mouth disease virus. IN: Voprosy veterinarnoy virusologii (Problems of veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 142-147.

239. Svet-Moldavskaya, I. A., and G. Ya. Svet-Moldavskiy. Antirabies vaccine that does not cause postvaccinal neuroparalytic complication. Voprosy virusologii, no. 1, 1962, 68-71.

240. Sviridov, A. A. The virus-neutralization reaction in tissue as a means of evaluating immunity to foot-and-mouth disease. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 227-232.

241. Syurin, V. I. Use of a dry lapinzed vaccine against rinderpest. Report one. Immunogenic properties of a rinderpest vaccine. IN: Voprosy veterinarnoy virusologii (Problems of verterinary virology). Moskva, Kolos, 1964, 298-306.

242. Syurin, V. I. Adaptation of Aujesky virus to various primary cell cultures. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964, 489-496.

243. Syusyukin, A. A., et al. Reproduction of foot-and-mouth virus in a suspension of cattle kidney cells. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 138-141.

244. Tashliyev, A. O., et al. Characteristics of the bird population of certain regions of the Western Kopet-Dag. IN: Akademiya nauk Turkmenskoy SSR. Izvestiya, Seriya biologicheskikh nauk, no. 4, 1965 45-50. JPRS 34186

245. Trubitsyn, B. I. Culturing viruses in newborn rabbits and monolayer tissue cultures. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 130-137.

246. Tsilinskiy, Ya. Ua. Inhibitors of viral activity from uninfected cultures of stable cell lines. Report II. Properties of inhibitors. Acta virologica, v. 7, no. 5, 1963, 437-446.

247. Tsirkin, Yu. M. Modified method of rapid identification of tickborne and Japanese encephalitis viruses with the hemagglutination-inhibition reaction. Voprosy virusologii, no. 6, 1965, 669-674.

248. Tatarinova, L. G. Isolation of TBE virus from thrushes. Voprosy virusologii, no. 1, 1962, 110.

249. Terskikh, I. I. et al. Aerosol immunization with liquid vaccines. IN: Akademiya meditsinskikh nauk SSR. Vestnik, no. 7, 1965, 47-55.

250. Terskikh, I. I., et al. Aerosol vaccination against TBE. Voprosy virusologii, no. 3, 1965, 359-360.

251. Terzukhanov, A. B. Characteristics of certain strains of swine-plague virus obtained in tissue culture. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 257-262.

252. Titova, N. G. Multiplication of TBE virus in chick-embryo cultures and its liberation from the cells. Voprosy virusologii, no. 1, 1962, 50-55.

253. Trukhmanov, V. G., and Yu. V. Fedorov. Effect of hormones (cortisone and ACTH) on postvaccinal immunity to TBE. Voprosy virusologii, no. 5, 1962, 537-539.

254. Tsion, R. A., Aujesky's disease. IN: Orlov, F. M., comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals). Moskva, Sel'khozizdat, 1963. 152-169.

255. Tsirkin, L. M., et al. Improved laboratory diagnosis of tickborne spring-summer encephalitis. II. Virus-neutralization tests in chick-embryo cell cultures based on the hemagglutination phenomenon. Acta virologica, v. 8, no. 3, 1964, 249-253.

256. Tuisheva, R. M. Means of improving vaccinoprophylaxis of rabies. Voprosy virusologii, no. 6, 1962, 680-683.

257. Unanov, S. S. Study of immunological activity of a tissue vaccine against TBE. Voprosy virusologii, no. 3, 1964, 357-361.

258. Unanov, S. S., et al.. Preliminary results of efficacy test of a tissue-culture vaccine against TBE. Voprosy virusologii, no. 1, 1964, 42-46.

259. Unanov, S. S., and A. V. Shutob. Immunological shifts in persons vaccinated and revaccinated with tissue-culture TBE vaccine. Voprosy virusologii, no. 5, 1964, 604-608.

260. Unanov, S. S. Immunoprophylaxis of TBE. Voprosy virusologii, no. 4, 1965, 462-467.

261. Unanov, S. S., et al. Isolation of strains of tick-borne encephalitis virus from *Ixodes persulcatus* ticks collected during the 1964 epidemic season. Voprosy virusologii, no. 6, 1965, 674-677.

262. Uvarov, V. N. Concentrating Japanese encephalitis virus. Voprosy virusologii, no. 4, 1965, 486-488.

263. Vereta, L. A., and T. P. Yur'yeva. Comparison of some epidemiological factors in tickborne encephalitis and epidemic hemorrhagic fever with the renal syndrome. IN: Khabarovskiy nauchno-issledovatel'skiy institut epidemiologii i mikrobiologii. Uchenyye zapiski, no. 7, 1962, 20-22. (TAKEN FROM: Referativnyy zhurnal. Biologiya, no. 6, 1964, abs. 6K98)

264. Vereta, L. A. Experimental verification of the alimentary transmission of TBE virus. Voprosy virusologii, no. 2, 1963, 245-246.

265. Vereta, L. A., and T. P. Yur'yeva. Demonstration of a complement fixing antigen for diagnosing Omsk fever. Voprosy virusologii, no. 2, 1965, 275-280.

266. Vereta, L. A. Isolating complement fixing antigens from TBE virus. Voprosy virusologii, no. 4, 1965, 495.

267. Vilcek, J. and B. Rada. Antiviral action of an interferon from tickborne encephalitis virus-infected cells. III. Acta virologica, v. 6, no. 1, 1962, 9-16.

268. Vilcek, J. Interferon from cultures infected with tickborne encephalitis virus. IV. Comparison with interferon from influenza virus-infected cells. Acta virologica, v. 6, no. 2, 1962, 144-150.

269. Vilcek, J., and D. Stancek. Formation and properties of interferon in the brain of tickborne encephalitis virus-infected mice. Acta virologica, v. 7, no. 4, 1963, 331-338.

270. Vlodavets, V. V., et al. Effect of relative humidity on influenza virus in aerosol. Voprosy virusologii, no. 3, 1965, 367-368.

271. Vlodavets, V. V., and S. Ya. Gaydamovich. Method of trapping influenza virus in the droplet phase of an aerosol. Report 3. Effectiveness of catching virus particles in soluble filters of various kinds. Voprosy virusologii, no. 2, 1963, 248-250.

272. Vorob'yeva, M. M. Purifying lapinized foot-and-mouth disease virus. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 190-195.

273. Vorob'yeva, M. S. Experimental investigation of Humoral immunity in reptiles infected with tickborne encephalitis virus. Voprosy virusologii, v. 10, no. 1, 1965, 36-41. JPRS 33724

274. Vorob'yeva, M. S., et al. Investigation of specific antibody contents from TBE virus tissue extracts of mouse-like rodents in an epidemic focus. Voprosy virusologii, no. 6, 1964, 733.

275. Votyakov, V. I., and I. I. Protas. Course of experimental infection in sheep infected with strains of tickborne encephalitis virus isolated in different geographic zones of the USSR. Voprosy virusologii, vol. 10, no. 4, 1965, 454-462. JPRS 32,992

276. Yagodinskiy, V. N., and B. I. Skvortsov. Experimental isolation in tissue culture of TBE virus from vectors. Voprosy virusologii, no. 4, 1962, 39-42.

277. Yegorova, L. S., et al. Mixed epizootic of tularemia and Omsk hemorrhagic fever in muskrats in Western Siberia. Zhurnal mikrobiologii, epidemiologii i immunobiologii, no. 12, 1964, 26-29.

278. Yankovskiy, A. K., et al. Some data on the natural foci of hemorrhagic fever with the renal syndrome in Moscow Oblast. Zhurnal mikrobiologii, epidemiologii i immunobiologii, no. 12, 1963, 46-51.

279. Yershov, F. I., and V. A. Vagzhanova. Reproduction dynamics for VEE virus in cell culture. Voprosy virusologii, no. 2, 1965, 176-181.

280. Yershov, F. I., and A. A. Tsareva. Synthesis site of VEE virus. Voprosy virusologii, no. 3, 1965, 349-351. JPRS 32,634

281. Zagniborodova, Ye. N. Epizootological significance of migrating fleas of the great gerbil in Turkmeniya. IN: Akademiya nauk Turkmenskoy SSR. Izvestiya. Seriya biologicheskikh nauk, no. 5, 1964, 65-70.

282. Zagniborodova, Ye. N., and G. S. Bel'skaya. Fleas of birds nesting in burrows and their possible role in the epizootiology of plague in Turkmenia. IN: Akademiya naux Turkmenskoy SSR. Izvestiya. Seriya biologicheskikh nauk, no. 3, 1965, 69-74. JPRS 33724

283. Zaklinskaya, V. A., et al. Immunogenic and antigenic activity of inactivated cultural vaccine with respect to various viruses of the antigen complex of tickborne encephalitis. Voprosy virusologii, no. 6, 1965, 649-656.

284. Zakorkina, T. N. Viremia in experimental infections with Omsk fever virus. Voprosy virusologii, no. 6, 1962, 742.

285. Zasukhina, G. D., and Ya. Zavada. Influence of chemical and physical mutagenic factors on TBE virus. IN: Genekika microorganizmov (Genetics of microorganisms). Medgiz, 1963. 200-207.

286. Zasukhima, G. D., and I. A. Rapoport. Investigation of genetic variability characters of TBE virus clones obtained under the influence of chemical mutagenic factors. Genetika, no. 5, 1965, 33.

287. Zasukhina, G. D., and I. A. Rapoport. Chemically induced mutation of some arboviruses. Genetika, no. 1, 1966, 89-99. JPRS 35,684

288. Zeytlenok, N. A., et al. Effect of 3-methylmercapto-4-This-6-azauracil (MMTA) on picornavirus multiplication. Acta virologica, no. 1, 1965, 60-64.

289. Zhalko-Titarenko, V. P. An experimental study of polydispersed bacterial aerosols. Zhurnal mikrobiologii, epidemiologii i immunobiologii, no. 1, 1965, 123-129.

290. Zhalko-Titarenko, V. P. An experimental study of polydispersed bacterial aerosols. Report III. A study of diphtheria bacillus aerosols. Zhurnal mikrobiologii epidemiologii i immunobiologii, no. 2, 1965, 68-73.

291. Zholanov, V. M., et al. Accellerating reproduction of VEE virus by actinomycin D. Acta virologica, v. 8, no. 4, 1964, 378-379.

292. Zhdanov, V. M., and G. A. Smirnova. Nature of the inactivating effect of animal tissue extracts against myxovirus hemagglutinius. Acta virologica, v. 9, no. 2, 1965, 137-143.

293. Chemotherapy of viral infections. Voprosy virusologii, no. 5, 1965, 628.

APPENDIX I.

SUPPLEMENTARY BIBLIOGRAPHY OF ARTICLES AND BOOKS CONCERNING DIAGNOSIS, THERAPY, EPIDEMIOLOGY AND MISCELLANEOUS STUDIES OF VIRAL DISEASES PUBLISHED BETWEEN 1962 AND 1965. LISTED ALPHABETICALLY BY AUTHOR.

1. Arkhipov, N. I. Morphological changes in swine plague virus-infected spleen cultures. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 253-256.

2. Arkhipov, N. I. changes in capillary permeability in acute swine plague. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 291-297.

3. Avakyan, A. A., F. M. Kirillova, I. B. Pavlova, A. D. Al'tshteyn, and L. N. Kats. Materials pertaining to the study of etiology of hemorrhagic fever with a renal syndrome. Zhurnal mikrobiologii, epidemiologii i immunobiologii, no. 7, 1964, 129-134.

4. Bazhedomova, N. A., and S. F. Zakirova. Hemagglutinin characteristics of TBE viruses during repeated passages on SMH cells and human-embryo kidney cultures. Voprosy virusologii, no. 6, 1964, 730.

5. Bektemirov, T. A. Interference between vaccinia, and variola viruses in chick embryos. Acta virologica, v. 9, no. 6, 1965, 541-550.

6. Beladi, I., and M. Bakay. Persistent pseudorabies virus infection in calf cells. Acta virologica, v. 7, no. 5, 1963, 477.

7. Belkov, G. P. The Fourteenth All-Union Conference of Epidemiologists and Microbiologists and Infectionists held in Moscow on June 29 to July 4 1964. Zhurnal mikrobiologii, epidemiologii i immunobiologii, no. 1, 1965, 150-152.

8. Borodina, T. A. Keratogenic properties of TBE virus. Voprosy virusologii, no. 3, 1964, 354-357.

9. Bukrinskaya, A. G., F. I. Yershov, and V. M. Zhdanov. Luminescent microscopy study of tissue-culture cells during the initial phase of their interaction with Sendai virus. Voprosy virusologii, no. 1, 1962, 18-22. JPRS 19401

10. Chistova, Z. Ya. and V. N. Syurin. Mutants of avian laryngotracheitis virus. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 413-425.

11. Chumakov, M. P. Classification and nomenclature of viruses in the TBE antigenic subgroup. Voprosy virusologii, no. 3, 1965, 376-380.

12. Danielova, V. Multiplication dynamics of Taleyna virus in different body parts of *Aedes vexans* mosquitos. Acta virologica, v. 6, no. 3, 1962 227-230.

13. Degyatkova, R. G. Role of TBE virus RNA in experimental infections in mice. Voprosy virusologii, no. 3, 1963, 275-278.

14. **Dyadichev, N. R. Defining the concept of epidemic process. Zhurnal mikrobiologii, epidemiologii i immunobiologii, no. 6, 1965, 145.**

15. Dzhivanyan, T. I., and G. D. Zasukhina. Investigation of pathogenic properties of two variants of one strain of WEE virus. IN: Aktual'nyye problemy virusnykh infektsiy, 1965, 177.

16. Galabov, S., and I. Gagov. Attempts at cultivating certain viruses of the myxogroup in microbe suspensions treated with ultrasound and untreated. IN: Bulgarska akademiya na naukite. Doklady, v. 18, no. 11, 1965, 1039-1042.

17. Galant, I. B. Experiments of V. I. Ilenko and O. A. Pokrovskaya with inoculation of monkeys with tick-borne encephalitis. Zhurnal nevropatologii i psikhiatrii, v. 64, no. 1, 1964, 158-159.

18. Galegov, G. A., and V. M. Zhdanov. Inclusion of carbon^{14} uridine into cell cultures infected with poultry pseudoplague virus and inhibition of the synthesis of viral ribonucleic acid. IN: Akademiya nauk SSSR. Doklady, v. 165, no. 3, 1965, 690-691.

19. Gaydamovich, S. Ya., and Duan-Suan Myesu. Chromatographic fractionation of Japanese encephalitis virus on calcium phosphate columns. Voprosy virusologii, no. 2, 1965, 213-217.

20. Gaydamovich, S. Ya., and V. R. Obukhova. Hemagglutinating antigens from TBE virus from tissue cultures. Voprosy virusologii, no. 3, 1965, 362.

21. **Grigoryeva, L. V., and T. V. Starovoytova. The frequency of recovery of certain enteroviruses and bacteria in water basins and sewage. Gigiyena i sanitariya, no. 7, 1965, 108-109.**

22. Hoptman, J. Medical virology in the USSR. I. C. R. S. Medical Reports. Monograph on Soviet Medical Sciences, no. 1. Fordham University Press. 1962.

23. Israelyan, A. A., and G. D. Zasukhina. Variability of virus during passage through various organisms. Voprosy virusologii, no. 3, 1965, 285-287.

24. Ivanisova, S., R. Skoda, V. Mayer, and F. Sokol. Inactivation of **Aujeszky's disease (Pseudorabies)** virus by nitrous acid. Acta virologica, v. 7, no. 1, 1963, 7-15.

25. Kaulen, D. P. Fourth interinstitute conference on problems of radiation microbiology and immunology. Meditsinskaya radiologiya, no. 7, 1964, 68-71.

26. **Kereyev, N. I. Materials on the geography of endemic infections in Kazakhstan. IN: Akademiya nauk Kazakhskoy SSR. Vestnik, no. 2, 1965, 7-11.**

27. Kislyakova, L. N., G. S. Tseraidis, V. M. Zhdanov, M. G. Bogdanova, and M. I. Limarenko. A study of viral etiology of chronic pemphigus. Voprosy virusologii, no. 3, 1964, 320-324.

28. Klimenko, S. M., et al. Features of VEE virus structure. voprosy virusologii, no. 5, 1965, 520-525.

29. Kolosov, V. M. Adaptation of fowl-plague virus to pigeon embryos. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos,, 1964. 371-376.

30. Kravchenko, A. T., and A. D. Al'tshteyn. Problems of oncogenic safety of live virus vaccines. Voprosy virusologii, no. 5, 1964, 527-532. JPRS 27714

31. Krivishiy, A. S. Viruses and their position in nature. Priroda, no. 10, 1964, 23-37.

32. Kukhto, A. F. Serapie. IN: Orlov, F. N., comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals). Moskva, Sel'khozizdat, 1963. 307-320.

33. Kulik, D. M. Catamnesia of patients with psychic disturbances caused by antirabies vaccine. Zhurnal nevropatologii i psikhiyatrii, v. 65, no. 6, 1965, 913-917.

34. Lezhava, G. A., and A. Ya. Urushadze. Biological properties of avian laryngotracheitis virus. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 401-412.

35. Libikova, H., V. Smidova, and N. Valentova. Neutralization tests with a cytopathic variant of tickborne encephalitis virus in stable cell lines. Acta virologica, v. 6, no. 1, 1962, 91.

36. Libikova, H. Assay of TBE virus in Hela Cells III. Selection and properties of virus antigens for an *in vitro* neutralization test. Acta virologica, v. 7, no. 6, no. 6, 1963, 516-524.

37. Likhachev, N. V. Cowpox. IN: Orlov, F. N., comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals). Moskva, Sel'khozizdat, 1963. 45-77.

38. Likhachev, N. V. African swine plague. IN: Orlov, F. N., comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals). Moskva, Sel'khozizdat, 1963. 497-506.

39. Lyks, S. R. Mechanism of the formation of noninfectious "Acridinic" polic antigen. Voprosy virusologii, no. 6, 1964, 652-656.

40. L'vov D. K., V. A. Zaklinskaya, and K. V. Fokina. Dynamics of serological indicators of immunity in animals immunized with TBE vaccine. Voprosy virusologii, no. 4, 1963, 420-427.

41. L'vov, D. K., V. A. Zaklinskaya, and M. P. Chumakov. Serological immunity indicators in humans after injection of a TBE vaccine. Voprosy virusologii, no. 4, 1963, 427-435.

42. L'vov, D. K., et al. Spectrum of antihemmagglutinating antibodies after experimental immunization with viruses of the TBE complex. Voprosy virusologii, no. 6, 1965, 657-663.

43. Marennikova, S. S., and N. N. Mal'tseva. Comparative study of some vaccinia virus strains. Communication 2. Pathogenicity for laboratory animals. Voprosy virusologii, no. 3, 1964, 287-291.

44. Marrennikova, S. S., N. N. Mal'tseva, and M. A. Yumasheva. Origins of vaccinia virus. Voprosy virusologii, no. 6, 1965, 717-719.

45. Mastyukova, Yu. N., A. A. Symarokov, and N. T. Sarayeva. Mechanism of antismallpox immunity. Communication 2. Role of leucocytes in smallpox immunity. Investigation of organ homogenates from infected animals. Voprosy virusologii, no. 1, 1964, 90-95.

46. **Mayer, V. Virulence of tickborne encephalitis virus. III. Bioevaluation of large and small plaque variants of the TE virus complex. Acta virologica, v. 8, no. 6, 1964, 507-520.**

47. **Mayer, V., and R. Skoda. Behavior of modified and virulent strains of Pseudorabies (Aujeszky's disease) viruses at different temperatures. Acta virologica, v. 6, no. 1, 1962, 95.**

48. Morez, A. G. Effect of ionizing radiation on the reproduction of epidemic parotitis virus in white mice and guinea pigs. Voprosy virusologii, v. 9, no. 1, 1964, 66-72. JPRS 23,956

49. Orlov, F. M. Equine influenza. IN: Orlov, F. M., comp. Virusnyye bolezni zhivotnykh (Virus disease of animals). Moskva, Sel'khozizdat, 1963. 422-427.

50. Parfanovich, K. I., and N. N. Sokolov. Interaction of nucleic acids with specific intracellular antigens in mixed infections. Report One. Appearance and distribution of nucleic acids in mixed infections caused by herpes and TBE viruses. Voprosy virusologii, no. 2, 1965, 241.

51. Parfanovich, K. I., and N. N. Sokolov. Interaction of nucleic acids with specific intracellular antigens in mixed virus infections. Report 2. Voprosy virusologii, no. 2, 1965, 242.

52. **Pavlovskiy, Ye. N., A. A. Pchelkina, and F. F. Talyzin. Cross-neutralization with the aid of sera of animals affected with snake venom of encephalitis virus. IN: Akademiya nauk SSSR. Doklady, v. 156, no. 5, 1964, 1239-1240.**

53. Pavlovskiy, Ye. N., I. I. Rogozin, and Kh. Kotlyarova. Natural focal point of transmitted diseases in connection with the topological epidemiology of zooanthroponosis. Zhurnal mikrobiologii, epidemiologii i immunobiologii, no. 6, 1965, 156-157.

54. Pille, E. R. Viruses of monkeys. Voprosy virusologii, no. 2, 1965, 131-138. JPRS 31143

55. Pirog, P. P. Viral pneumonia of pigs. IN: Orlov, F. M. comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals). Moskva, Sel'khozizdat, 1963. 513-522.

56. Pirog, P. P. Viral gastroenteritis of swine. IN: Orlov, F. M., comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals). Moskva, Sel'khozizdat, 1963. 522-531.

57. Pisarski, Z., and R. Pruszynski. Important data regarding the prevention of rabies. Przeglad epidemiologiczny, v. 19, no. 2, 1965, 181-182.

58. Pogodina, V. V., and S. S. Magazannik. Natural immunity to native and clinical forms of latent TBE. Voprosy virusologii, no. 2, 1962, 243-244.

59. **Pogodina, V. V. Comparative study of viruses of the tickborne encephalitis complex with respect to viremia. Acta virologica, v. 8, no. 2, 1964, 113-122.**

60. Popova, O. M., and O. N. Berezina. The effect of preliminary roentgen irradiation on the susceptibility of white mice to the ornithosis virus, upon infection with an aerosol of the virus. Voprosy virusologii, no. 2, 1964, 213-216.

61. Pospelova-Shtrom, M. V., and R. L. Naumov. Case of carrying into the USSR of *Haemaphysalis ornithophila* Hoog. et Kohls, tick (Ixodoidea, Ixodidea) by the migratory bird *Turdus dauma* Lath. Zoologicheskiy zhurnal, v. 44, no. 9, 1965, 1411-1412. JPRS 34186

62. Poteiyevskiy, E. G., and L. A. Vereta. Complement-fixation dynamics of TBE antigen in sera of infected animals. Voprosy virusologii, 4, 1965, 494.

63. Priymyagi, L. S. Effect of interferon on RES cell lines infected with TBE virus. Voprosy virusologii, no. 2, 1965, 225-226.

64. Protas, I. I., and V. I. Motyakov. Clinical forms of mite and tick encephalitis in Belorussia. Zhurnal nevropatologii i psikhiatrii, v. 65, no. 3, 1965, 361-366.

65. Romanova, L. N., A. T. Kravchenko, and I. G. Vasil'yeva. Pathogenesis of allergic complications due to viruses. Report 1. Development of infection in mice given repeated sublethal doses of fixed rabies virus. Voprosy virusologii, no. 4, 1965, 430-435.

66. Salganik, R. N., and A. A. Trukhachev. Effect of DNA-ase on the multiplication of adenoviruses in tissue culture. IN: Akademiya nauk SSSR. Sibirskoe otdeleniye. Izvestiya. Seriya biologo-meditsinskikh nauk, no. 8, v. 2, 1963, 99-101.

67. Savenko, S. N. Relation of multiple sclerosis and acute encephalomyelitis epidemics. Zhurnal nevropatologii i psikhiatrii, v. 64, no. 3, 1964, 360.

68. Semenov, B. F. Multiplication of TBE-type viruses in chick-fibroblast cultures. Voprosy virusologii, no. 2, 1964, 169-173.

69. Serov, M. F. Abortion virus of sheep. IN: Orlov, F. M., comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals). Moskva, Sel'khozizdat, 1963. 332-344.

70. Shashayev, M. A. Biological characteristics of plague bacteriophages. IN: Zhurnal mikrobiologii epidemiologii i immunobiologii, no. 12, 1964, 32-35.

71. Schramek, S., V. Mayer, and S. Zemla. Oxygen uptake and aerobic glycolsis of human cells persistantly infected with tickborne encephalitis. Acta virologica, v. 6, no. 3, 1962, 285.

72. Semenov, B. F., G. M. Stepanov, E. E. Rozina, Yu. Z. Gendon, B. I. Chernos, and Ya. Ye. Khesin. Viruses which effect albino mice similar to TBE virus. Voprosy virusologii, no. 2, 1964, 169-173.

73. Sergeyev, V. A. Effect of various conditions on reproduction of virus in trypsinized swine spleen cultures. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 242-247.

74. Sergeyev, V. A. Infectious rhinotracheitis of cattle. IN: Orlov, F. M., comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals). Moskva, Sel'khozizdat, 1963. 264-275.

75. Sergeyev, V. A. Mucous-membrane diseases of cattle. IN: Orlov, F. M., comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals). Moskva, Sel'khozizdat, 1963. 275-285.

76. Segeyev, V. A. Viral diarrhea of cattle. IN: Orlov, F. M., comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals). Moskva, Sel'khozizdat, 1963. 285-293.

77. Shcherbatykh, P. Ya. American infectious equine encephalomyelitis. IN: Orlov, F. M., comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals). Moskva, Sel'khozizdat, 1963. 169-175.

78. Shtannikov, Ye. V. Purification of virus-contaminated water by means of ion-exchange polymers. Gigiyena i sanitariya, no. 11, 1[illegible], [illegible].

79. **Shukeyr, A. A. Pathomorphology of experimental rabies in laboratory animals infected with a Fleury strain adapted to chick embryos. Voprosy virusologii, no. 5, 1963, 568-574.**

80. **Shvarev, A. I. Spinal and radicular forms of lymphocytaric choriomenengitis. Zhurnal nevropatologii i psikhiatrii, no. 9, 1964, 1290-1294.**

81. Skalinskiy, Ye. I. Submicroscopic changes caused by pigeon-pox virus. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 431-444.

82. Smorodintsev, A. A. First page in virus study. Nauka i zhizn', no. 12, 1964, 52.

83. Solov'yev, V. D. Some results of studies in antiviral immunity of tissue. Voprosy virusologii, no. 5, 1964, 580-587. JPRS 27714

84. Solov'yev, V. D. Transformation capacity of wild and laboratory strains of vaccinia. Voprosy virusologii, no. 3, 1965, 307-315.

85. **Stancek, D. Relationship of tickborne encephalitis virus to L-cells. Acta virologica, v. 7, no. 3, 1963, 225-232.**

86. **Strogov, A. K. Epizootic cattle fevers (bovine influenza). IN: Orlov, F. M., comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals). Moskva, Sel'khozizdat, 1963. 242-246.**

87. Strogov, A. K. Blue tongue of sheep. IN: Orlov, F. M., comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals). Moskva, Sel'khozizdat, 1963. 246-264.

88. Sushkov, F. V., V. I. Ryabov, and O. N. Karpov. Response of tissue cultures to X-rays following viral infection. IN: Voprosy veterinarnoy virusologii (Problems of veterinary virology). Moskva, Kolos, 1964. 67-74.

89. Svet-Moldavskiy, G. Ya. Historical study of Far-East TBE. Voprosy virusologii, no. 1, 1965, 99.

90. Terskikh, I. I., and G. K. Zairov. Comparative study of trachoma and ornithosis viruses. Voprosy virusologii, no. 6, 1964, 674-677.

91. Tsion, R. A. Scotland sheep encephalomyelitis. IN: Orlov, F. M., comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals). Moskva, Sel'khozizdat, 1963. 293-300.

92. Tsion, R. A. Swine influenza. IN: Orlov, F. M., comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals). Moskva, Sel'khozizdat, 1963. 506-513.

93. Vasilenko, V. A., and P. N. Kosyakov. Is there a relationship between inherent and acquired immune reactions of the organism to a virus infection? Voprosy virusologii, no. 1, 1964, 78-82.

94. Vigovskiy, A. I. The isolation of a TBE group virus from a patient in the west Ukraine. Voprosy virusologii, no. 2, 1964, 163-166.

95. **Votyakov, V. I., and T. I. Lemeshevskaya. TBE in Belorussia. Communication 2. Cultivation of Belorussian strains in cell cultures. Voprosy virusologii, no. 5, 1964, 608-614.**

96. **Yelkin, I. I., and V. K. Yashkul'. Zhurnal mikrobiologii, epidemiologii i immunobiologii, no. 1, 1965, 91.**

97. **Yelkin, I. I., and V. K. Yashkul'. Problems of epidemiological geography. Report four. Zonal regional and residual nosological areas of disease. Zhurnal mikrobiologii, epidemiologii i immunobiologii, no. 2, 1965, 73-80.**

98. **Yelkin, I. I., and V. K. Yashkul'. Epidemiological geography problems. Report five. Factors conditioning the geographical distribution of causative agents of natural focus zoonozes. Zhurnal mikrobiologii, epidemiologii i immunobiologii, no. 10, 1965, 116-124.**

99. Yelkin, I. I., and V. K. Yashkul. Problems of epidemiological geography. Part four. Formation of nosological areas of the zoonoses with natural nidality. Zhurnal mikrobiologii, epidemiologii i immunobiologii, no. 12, 1965, 70-78.

100. Yershov, F. I., V. M. Zdanov, and A. A. Tsarenva. Reproduction of Venezuelan equine encephalomyelitis virus in cells treated with actinomycin. Antibiotiki, no. 3, 1965, 250-255.

101. Zalkind, S. Ya., et al. Morphological and cytochemical studies of the effects of tickborne encephalitis virus on tissue culture cells. Acta virologica, v. 6, no. 5, 1962, 447-451.

102. Zasukhina, G. D., and I. A. Rapoport. Effect of chemical mutagenic factors on the TBE virus. Communication I. Variability of TBE virus under the influence of 5-bromouracil and 1,4-bis-diazoacetylbutane. IN: Materialy II nauchnoy sessii Instituta poliomiyelita i virusnykh entsefalitov AMN SSSR, Moscow, 1964, 46.

103. Zhdanov, V. M., N. B. Azadova, and A. G. Bukrinskaya. Study of interaction of Sendai virus with tissue cultures by the fluorescent-antibody method. Voprosy virusologii, no. 2, 1962, 162-167. JPRS 19625

104. Zhdanov, V. M., M. A. Lipkind, S. N. Klimenko, and L. Ya. Zakstel'skaya. Some parameters of Sendai virus nucleocaspid. Voprosy virusologii, no. 4, 1964, 412-417.

105. Zhdanov, V. M., V. N. Shaikhanova, and F. I. Yershov. Polycistronic composition of viral RNA. Voprosy virusologii, no. 5, 1[illegible], [illegible]-[illegible].

106. Zhdanov, V. M., and F. I. Yershov. Actinomycin D as an *in vitro* dye and fluorochrome. IN: Akademiya nauk SSSR. Doklady, v. 162, no. 4, 1965, 932-933.

107. Zhdanov, V. M., L. A. Mel'nikova, I. A. Kozlova, I. G. Balandin, O. P. Peterson, and L. Masharina. Suppression of synthesis of smallpox vaccine virus by histone. IN: Akademiya nauk SSSR. Doklady, v. 165, no. 5, 1965, 1182-1183.

108. Zhimatov, Kh. Zh. Problems of biosynthesis of viruses. IN: Akademiya nauk Kazakhskoy SSR. Vestnik, no. 5, 1962, 10-19. JPRS 15188

109. Zhumatov, Kh. Zh. Contemporary data on the molecular structure of viruses. IN: Akademiya nauk Kazakhskoy SSR. Vestnik, no. 3, 1965, 28-39.

110. Zinshenko, A. P. The problem of the role of rabies virus in the etiology of multiple sclerosis and encephalomyelitis. Zhurnal nevropatologii i psikhiatrii, v. 65, no. 11, 1965, 1634-1641.

111. Zubshitskiy, Yu. N. Study of the distribution of proeins of alien origin in a human nonimmune organism and the possible duration of their stay by the luminescent-antibody method. IN: Akademiya nauk SSSR. Doklady, v. 155, no. 1, 1964, 234-237.

112. Zverev, P. I. Malignant catarrhal diseases of cattle. IN: Orlov, F. M., comp. Virusnyye bolezni zhivotnykh (Virus diseases of animals). Moskva, Sel'khozizdat, 1963. 231-241.

APPENDIX II.

REPORTS OF CONFERENCES ON VIRAL DISEASES HELD BETWEEN 1962 AND 1965 AND THEIR PARTICIPANTS

1. Baroyan, O. V. Summary report of the Presidium of the Academy of Medical Sciences, USSR. IN: Akademiya meditsinskikh nauk SSSR. Vestnik, no. 4, 1964, 6.

2. Belikov, G. P. Local application of antibiotics. Subject discussed at the Conference on the Use of Antibiotics held in Moscow 1963. Antibiotiki, no. 5, 1964, 471.

3. Belikov, G. P. Conference of the Presidium of the I. I. Mechnikov All-Union Scientific Medical Society of Epidemiologists Microbiologists and Infectious Diseases Specialists held 8 October 1965. IN: Akademiya nauk Kazakhskoy SSR. Vestnik, no. 9, 1966, 150.

4. Bychkova, M. V. Seventh Joint Scientific Session of the Poliomyelitis and Viral Encephalitis Institute of the Soviet Academy of Medical Sciences and the Byelorussian Institute of Epidemiology Microbiology and Hygiene devoted to a discussion of the problem of tickborne encephalitis. IN: Akademiya meditsinskikh nauk SSSR. Vestnik, no. 1, 1964, 89.

   Participants: Chumakov, M. P., Gilmanova, G. Kh., Gorchakovskaya, N. N., Karpov, S. P., Karpovic Panov, A. G., Pivanova, G. P., Robinson, I. A., Rzhakhova, O. Ye., Sarmanova, Ye. S., Serjeyeva, G. I. Shalunova, N. V., Smorodintsev, A. A., Stepanova, L. G., Vereta, L. A., Votyakov, V. I., Zasukhina, G. D.

5. Kats, L. N. Problems of biology and medicine discussed at the Thirteenth All-Union Conference on Luminescence held in Kharkov from 25 June to 1 July 1964. IN: Akademiya nauk SSSR. Izvestiya. Seriya biologicheskaya, no. 2, 1965, 319.

6. Kats, L. N. The Sixth Session of the Interdepartmental Scientific Methodological Commission on Anthrax Control held in Moscow 12--14 March 1964. Zhurnal mikrobiologii, epidemiologii i immunobiologii, no. 2, 1965, 156.

7. Veber, L. G. Proceedings of the Second Scientific Practices Conference devoted to the activities of sanitary epidemiologic centers of Sverdlovsk and its environs. Gigiyena i sanitariya, no. 7, 1964, 124-125.

8. Yerkhov, I. S. Joint Scientific Session on Vascular and infectious Diseases of the Nervous System held 9--12 December 1964 in Sverdlovsk. Zhurnal nevropatologii i psikhiyatrii, v. 66, no. 5, 1966, 791-792.

9. Fourteenth All-Union Conference of Epidemiologists and Microbiologists and infectious Disease Specialists held in Moscow from 29 June to 4 July 1964. Zhurnal mikrobiologii, epidemiologii i immunobiologii, no. 12, 1964, 3.

Participants: Alisov, P. A., Belikov, G. P., Sokolov, M. I., Timakov, V. D., Vashkov, V. I., Yelkin, I. I.

10. Ninth Scientific Session of the Poliomyelitis Institute. Voprosy Virusolcgii, no. 1, 1965, 121-126.

11. Seventeenth Scientific Session of the Institute of Virology im. D. I. Ivanovskiy of the Academy of Medical Sciences, USSR. Voprosy virusologii, no. 1, 1965, 119-121.

12. Zeytlenok, N. A. Poliomyelitis and other enterovirus diseases. IN: Akademiya meditsinskikh nauk SSSR. Vestnik, no. 3, 1964, 94-96.

In 1963, the Eighth Scientific Session of the Institute of Poliomyelitis and Virus Encephalitis of the Academy of Medical Sciences, USSR, was held in Moscow. Four hundred and thirty-nine scientists from 45 cities in 14 Soviet republics, 21 scientists from seven Communist countries, and two American virologists participated in the session.

The conference dealt with problems of eliminating poliomyelitis, poliomyelitis-like diseases, non-poliomyelitic enteroviruses, latent oncogenic viruses, the impro ement of live poliomyelitis vaccine, the nature of viruses, and their relationships with the cell. Twenty-six reports and talks were given on the study of the nature of diseases

observed after mass immunization similar to the mild forms of poliomyelitis and expressed in the form of a brief paresis of the lower extremity, not uncommonly recorded under the clinical diagnosis of "poliomyelitis" or "myelitis." The Session indicated the need for investigators to concentrate their attention on determining the nature of the flaccid pareses of undetermined etiology from the viewpoint of the possible role of Coxsackie A viruses, adenoviruses, new, still unknown viruses, as well as agents or factors which are not viruses. Serological studies with Coxsackie A virus strains adapted to tissue cultures, with antigens of other enteroviruses as well as adenoviruses, should be carried out on a broader scale and, depaending on the results of the investigation of paired sera, methods of isolating the viruses in suckling white mice should be used.

The Session recommended that the Ministry of Health, USSR, record and take into consideration the polyiomyelitis-like cases as "flaccid paresis of undetermined etiology." It is essential that in the case of these diseases as well as in cases suspicious of poliomyelitis, clarification of the diagnosis with a final recording of the diagnosis be made by commissions of authoritative specialists consisting of neuropathologists, specialists on infectious diseases, virologists, and epidemiologists. The Session also considered it necessary to organize qualified virological and serological studies in every case of a disease suspicious of poliomyelitis as well as of all cases of flacid paresis of undetermined etiology.

The Session indicated the expediency of 1) determining the list of laboratories which can perform the necessary and adequately qualified virological and serological studies for poliomyelitis, the ECHO viruses, and Coxsackie viruses; 2) dividing the territory of the USSR into regions, assigning them to the nearest virological laboratories according to the list mentioned, and in the absence of such laboratories, assigning them locally to the laboratories of large central institutes; 3) giving aid to the laboratories in the matter of equipment, and the creation of the required conditions for carrying out the work on the necessary scale.

At the Session, 48 reports were presented on the problem of nonpoliomyelitis enteroviruses and the diseases which they cause. A study was made of different types of interaction of enteroviruses with one another and in combination with infectious diseases in human beings and animals, and processes of variation of Coxsackie A viruses on their adaptation to different tissue cultures.

Seventeen reports presented the results of a complex study of latent tumor viruses, chiefly the OV40 virus (simian vacuolating), which can be found in virus vaccines. Frequent infection of Macacus rhesus monkeys with the OV40 virus was determined and frequent infection of monkeys of other species was also found when they were kept together with Macacus rhesus.

Twenty-six reports and talks were given over to the improvement of live poliomyelitis vaccine, and 24 reports on new data were presented and discussed on the nature of the viruses and their interrelations with the cells. The other reports were on problems such as the study of distinctive inhibitors of virus activity, formed in cultures of transplantable strains of cells free of viruses. These reports aroused great interest.

The Conference noted the great importance of theoretical studies presented in the field of genetics and physiology of viruses and experimental chemotherapy and recommended the further development of work along these lines, particularly on the study of the intracellular processes of virus multiplication and the biosynthesis of their components.

13. Levkovich, Ye. N. Seventh Joint Scientific Session of the Institute of Poliomyelitis and Virus Encephalitides of the Academy of Medical Sciences, USSR, and the Belorussian Institute of Epidemiology, Microbiology and Hygiene on tickborne encephalitis and other arbovirus diseases. IN: Akademiya meditsinskikh nauk SSSR. Vestnik, no. 1, 1964, 89-90.

In 1963 the Seventh Joint Scientific Session of the Poliomyelitis and Viral Encephalitis Institute of Epidemiology, Microbiology, and Hygiene sponsored a discussion of the problem of tickborne encephalitis

and other arbovirus diseases which was held in Minsk. Representatives of scientific institutions of 28 cities in the USSR as well as scientists from Czechoslovakia, a total of 181 participants, took part in the Session. One hundred and twenty-four reports were given on problems of differentiation and classification of viruses of the tickborne encephalitis group, new methods of studying arbovirus diseases and problems of epidemic-control measures, as well as data on the distribution of other arboviruses on the territory of the Soviet Union.

Reports of the following Soviet scientis were presented: M. P. Chumakov, L. G. Karpovich, Ye. S. Sarmanova, G. I. Sergeyeva, M. V. Bychkova, V. O. Tapupere; and from Bratislava, Czechoslovakian scientists Ye. O. Libkova, V. Mayer, R. Rzegacek, O. Kozukh, and E. Eriek concerning the isolation of virus strains different from the viruses of the tickborne encephalitis isolated in Kemerovskaya oblast' from *Ixodes persulcatus* ticks from sick persons with symptoms of an undetermined fevrile illness. It was determined that these strains are distinctly different from the viruses of the tickborne encephalitis group with respect to their behavior in tissue cultures, their range of pathogenicity for animals, and in their antigenic structure. The fact that the strains isolated were arboviruses was substantiated. On a comparative study of these strains with different serological groups of other arboviruses, the characteristics of the isolated virus, which the authors called the "Kemerovskiy virus," were demonstrated. The finding of antibodies to this virus in the blood sera of human beings and animals in the region where the virus was isolated makes it possible to suppose that it has a possible role in human pathology and that it circulates in nature.

In reports of Ye. N. Levkovich, V. I. Votyakova, V. V. Pogodina, O. Ye. Rzhakhova, I. A. Robinzon, and others, the possibility was shown of isolating, as individual species, the viruses of Far Eastern and Central Europeam encephalitides, Scotish encephalitis, Povassan, Omsk hemorrhagic fever, Kyasanur forest disease, and the Malayan virus (Langat).

On problems of the selection of attenuated strains of tickborne encephalitis, a number of reports and communications were given by L. G. Stepanova, G. D. Zasukhina, V. I. Mayer, Ye. O. Libikova, P. I. Al'brekht, and M. K. Tyushnyakova. Data were presented on obtaining strains of the tickborne encephalitis virus with attenuated nervous system virulence. A lively discussion revolved about the criteria characterizing attenuation of strains and possibiolities of utilizing the latter as a living vaccine. V. I. Il'yenko and A. A. Smorodintsev reported preliminary data on the testing of the immunogenic characteristics and side-effects produced by the live vaccine against tickborne encephalitis, prepared from the Malayan virus (Langat).

In the reports of V. I. Il'yenko, A. D. Al'tshteyn, N. V. Shalunova, A. G. Karpovich, Ye. N. Levkovich, and others, on the topic, "New Methods of Studying tickborne encephalitis," the studies dealt with the phenomenon of interference, the use of cultures and tissue, the hemagglutination-inhibition test, and others. It was shown that the interference phenomenon can be used for the demonstration in tissue culture of viruses which do not exert a cytopathogenic effect, for the titration of viruses, and for the determination of antibodies in blood sera. The accumulation of interferon in the tissue culture was noted.

A series of reports was given on the utilization of the cytopathogenic effect of the virus, immunofluorescence, the diffusion-in-gel test, plaque formation, and the hemagglutination-inhibition test by V. I. Votyakov, G. I. Sergeyeva, P. K. Al'brekht, Han Shih-Tse, P. S. Karaseva, N. V. Loginova, R. G. Desyatskaya, G. P. Pivanova, S. P. Karpov, L. A. Vereta, L. G. Karpovich, O. Ye. Rzhakhova, and others. Achievements in the field of applying tissue cultures to the study of tickborne encephalitis were presented. New serological methods, particularly the hemagglutination-inhibition test, have become extensively used in the practice of laboratory, clinical, and epidemiological research. The improvement of antigens for the hemagglutination-inhibition test as well as methods for eliminating nonspecific inhibition from them have been suggested.

A. A. Smorodintsev and S. A. A. Ananyan reported the use of the hemagglutination-inhibition test for the serological demonstration of arbovirus diseases, which made it possible to detect the existence of previously unknown foci of arthropod-borne diseases of group A, C, and Buniamwer (after Casals) in the territory of the USSR.

A comprehensive study was made of the mechanism of the circulation of the virus during the period of activity of ixodial ticks and outside of the period of the biocoenotic relationships of the tickborne encephalitis virus by zoologists, parasitologists, and virologists L. P. Nikiforov, Yu. A. Morozov, V. A. Bouko, L. A. Vereta, and others. Successful work was accomplished in controlling tickborne encephalitis through the utilization of the characteristic features of landscape types of foci for epizootological and epidemiological prognoses. Data on the study of the natural foci of tickborne encephalitis in various geographic regions of the Soviet Union were obrained for Belorussia, the Ukraine, the Urals, Siberia, the Far East, Tatarskaya ASSR, Udmurtskaya ASSR, and others by V. I. Votyakov, L. V. Gromashevskiy, G. I. Netskiy, L. G. Tatarinova, G. Kh. Gil'manova, A. V. Mishin, V. I. Chabovskiy, and others.

The clinical aspect of the problem of tickborne encephalitis and the tendency toward tickborne encephalitis evolution as a clinical phenomenon was presented in a review report by A. G. Panov, as well as in reports of A. I. Shapoval, K. G. Umanskiy, R. M. Gararly, and others. The differentiation of Eastern and Western variants of tickborne encephalitis, reflecting the clinical characteristics and characteristics of the course of the disease, was considered sufficiently substantiated. It was recommended that the route of infection - arthropod-borne or alimentary - be formulated in the diagnosis. Attention was called to the need for seeking out new, more effective methods and means of therapy.

In a report by D. K. L'vov and others, data on the extensive testing of cultured, inactivated vaccine against tickborne encephalitis were presented.

Epidemiological observations and serological experiments have shown that it produces no side effects and that it is highly effective immunologically.

APPENDIX III.
SOME SOVIET VIROLOGICAL RESEARCH INSTITUTES AND THEIR PERSONNEL

Introduction

The numerous Soviet institutions involved in virological research range from small stations or field hospitals dealing with specific problems to institutes covering the entire field. The latter perform the important research and publish most of the scientific materials on the subject. All-Union institutes also carry out studies directed toward policymaking and serve as advisory bodies to the Ministry of Health, USSR; the main virological institute in each Soviet Republic performs a similar function. Usually the central institute does research work and coordinates the studies of sanitation stations, public-health centers, and field hospitals. Among the leading institutes in Moscow are the D. I. Ivanovskiy Institute of Virology; Academy of Medical Sciences, USSR; the Institute of Poliomyelitis and Viral Encephalitis, Academy of Medical Sciences, USSR; the Institute of Epidemiology and Microbiology, Ministry of Health, RSFSR; and the Scientific Research Institute of Viral Preparations. Institutes in Leningrad include the Institute of Experimental Medicine, Academy of Medical Sciences, USSR, and the Medical Institute of Sanitation-Hygiene; the Institute of Medicine and the Institute for the Advanced Training of Physicians are located in Kiev.

The following is a list of institutions which are engaged in virological or closely related research. Affiliated scientists are listed under each institution, along with any available information on their professional qualifications, positions, and honors conferred upon them.

APPENDIX III.

SOME SOVIET VIROLOGICAL RESEARCH INSTITUTES AND THEIR PERSONNEL

All-Union Scientific Research Chemical-Pharmaceutical Institute im. G. K. Ordzhonikidze

Belikov, G. P.
Daniyelyan, N. M.
Katunina, V. T.
Pershin, G. N.

All-Union Scientific Research Institute of Railroad Hygiene, Ministry of Railroads, USSR

Ametirova, M. N.
Dubrovina, R. G.
Fayershteyn, S. G.
Kazakovtseva, Ye. D.
Koral'nik, B. P.
Kozina, T. P.
Kulinkova, N. K.
Parkhomenko, I. M.
Sokolova, N. N.

All-Union Scientific Research Institute of Veterinary Virology and Microbiology Ministry of Agriculture, USSR

Volosov, V. M.
Nikitin, Ye. Ye.
Pozdnyakov, A. A.
Sergeyev, V. A.
Syurin, V. N.
Vladimirov, A. G.

Belorussian Scientific Research Institute of Epidemiology and Microbiology

Dir: Votyakov, Veniamin Iosifovich (specialty: virology). Doctor of Medical Sciences; Professor; Director of the Belorussian Scientific Research Institute of Epidemiology and Microbiology. Nominated for corresponding membership in the Academy of Medical Sciences, USSR by the academic councils of the Belorussian Institute of Epidemiology and Microbiology: the Belorussian Society of Epidemiologists, Microbiologists, and Infectious Disease Specialists; the Ministry of Health, Belorussian SSR, and the All-Union Scientific Medical Society of Epidemiologists, Microbiologists, and Infectious Disease Specialists im. I. I. Mechnikov.

Protas, T. T.

Central Asian Scientific Research Antiplague Institute, Alma-Ata

Shashayev, M. A.

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